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FOOD INDUSTRIES

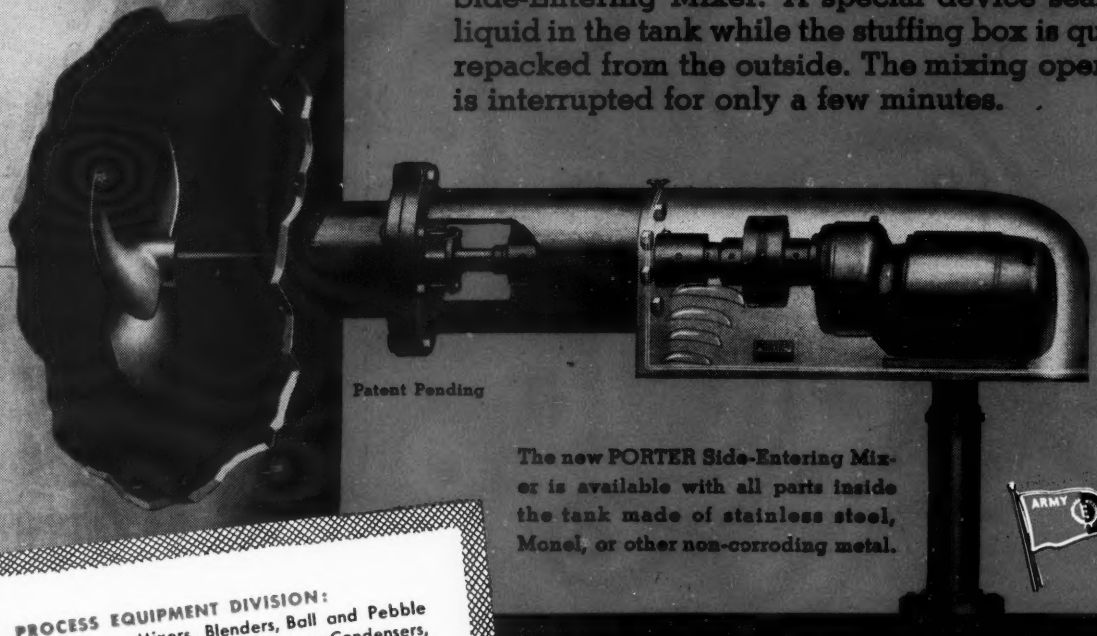
● FOR THOSE WHO CONTROL QUALITY THROUGH MANAGEMENT AND PRODUCTION

SAFE FOOD PROCESSING DEMANDS THE DEPENDABILITY OF

PORTER

Better-Built PROCESS EQUIPMENT

Equipment breakdowns in food processing sometimes mean spoiled batches, wasted materials. PORTER Equipment, better-built to give long, continuous, trouble-free operation, stays everlastingly on the job, with hardly any time out for servicing or repairs. For example, the new PORTER Side-Entering Mixer: A special device seals the liquid in the tank while the stuffing box is quickly repacked from the outside. The mixing operation is interrupted for only a few minutes.



Patent Pending

The new PORTER Side-Entering Mixer is available with all parts inside the tank made of stainless steel, Monel, or other non-corroding metal.

PORTER Better-Built Equipment Established 1880

ARMY NAVY

PROCESS EQUIPMENT DIVISION: Agitators, Mixers, Blenders, Ball and Pebble Mills, Autoclaves, Driers, Digesters, Condensers, Evaporators, Fractionating Columns, Heat Exchangers, Pressure Vessels, Tanks, Vulcanizers, Jacketed Fittings.

LOCOMOTIVE DIVISION: Diesel, Diesel-Electric, Electric, Steam, and Fireless Steam Locomotives.

QUIMBY PUMP DIVISION: Screw, Rotex, Centrifugal, Chemical Pumps.

ORDNANCE DIVISION: Projectiles, Heavy Forgings, Breech Blocks, Winches.

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THE COVER

No explanation is needed for the cover of this issue. It speaks its own important message. We urge that you heed it. By the time this issue reaches you, our soldiers will be engaged, or about to engage, in the greatest, bloodiest invasion in history. Don't let them down.—The Editors. (Photo from Press Association.)

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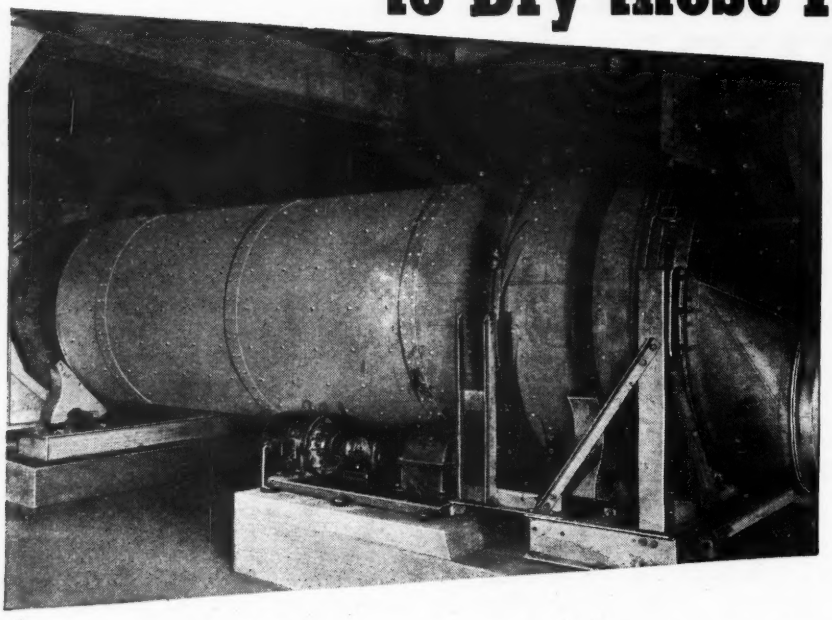
What Does It Cost YOU to Dry these Food Products?



Apples	Cocoa beans	Oats
Wheat Germ	Cocoa nibs	Peanuts
Beef	Coffee beans	Peas
Pork	Corn germ	Spices
Chicken	Corn	Sugar
Codfish	Copra	Sugar beet pulp
Almonds	Cheese, grated	Salt
Apple pomace	Citrus fruit refuse	Starches
Barley	Cotton seed	Soy beans
Beans	Hominy	Rice
Bran	Malts	Rye
Bread crumbs	Maize	Tea
Bread, sliced	Molasses feed	Tobacco
Casein	Nuts	Wheat
Cereals		

Roto-Louvre dryer installation which reduces the moisture content of shelled corn from about 20% to 12%. Dries uniformly without overheating and without breakage, meeting all necessary requirements in drying a product of this kind.

MODERN plants in many industries have found that the Roto-Louvre Dryer handles a large volume of material safely and quickly, cutting costs substantially. The proved Roto-Louvre principle gives these advantages: uniform drying; gentle handling; minimum dusting; no over-heating; high efficiency; small space; long life with low maintenance.

Write for this book

Engineers who know drying and dehydrating problems have prepared a booklet on Roto-Louvre drying. It explains, with diagrams, the Roto-Louvre principle, and shows how it has been applied to a wide variety of drying, dehydrating and cooling operations. Ask any Link-Belt office for Book No. 1911.

Here Are A Few Examples
Ask For Reports On Products Like Yours

MEAT. Cooperative efforts of Link-Belt and Swift & Co. engineers resulted in uniform dehydration of cooked, ground fresh beef and pork to meet lend-lease specifications.

SUGAR. Replacing two conventional dryers for Franklin Sugar Refining Company, a Roto-Louvre dryer gave cleaner, clearer, more lustrous crystals, less "fines".

SEED. Problem . . . drying seed containing a high percentage of oil, without disturbing the oil or scorching the seed. Roto-Louvre dryer solved it. It handles 2000 pounds of seed per hour, reduces moisture from 8% to 3% and, with an inlet temperature of around 500°F., the seed at discharge end is not over 130°F.

SOY BEAN MEAL. A Roto-Louvre Dryer now dehydrating soy bean meal was previously used, also with complete satisfaction, for copra meal, ground apricot kernels, and mustard seed.

See your material dried. Link-Belt engineers will be glad to test YOUR OWN material in a Roto-Louvre Dryer, if you wish. Many other performance records are available. Write Link-Belt, or call the nearest branch office. You may make a substantial saving in your drying costs, an improvement in your product. It's worth investigating.

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9584

FEED END of Roto-Louvre Dryer showing stationary distribution head and hot gas inlet manifold which directs gas into only those channels within the drum that are directly beneath the material bed.

LINK-BELT
THE SYMBOL OF QUALITY
LINK-BELT COMPANY
ROTO-LOUVRE HEAT DRYER

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THE COST OF
Tomorrow's Peace

Today peace-loving Americans are united with thirty-three other nations in a common objective of destruction.

Millions of our fine, young men and women find themselves invading foreign lands in order that their own shores may be spared, and their free way of life preserved.

Their sacrifices will be great. Their job will be well done.

But what of the job they will expect of us when they have finished theirs . . . the job of turning their hard-won victory into a lasting pattern of peace?

Can we come up to their great expectation? We must realize that this is the last opportunity of our generation. We must do a better job of it than we did in the Twenties and the Thirties.

We have our backs to the wall, and the scars of World War I and a thirteen-year depression still are upon us. The final test of our way of life is at hand!

As we look over our shoulder into the immediate past, we see little to encourage us. But we also see much to make us pause. We see a tremendous fighting machine, created in a matter of months by the miraculous organization of our resources.

We, the largest of the peace-loving nations, have overnight become masters at the business of waging war. Today, as a result of the coordination of industry, labor, and government, we are producing ***for war alone*** as much as our total normal production for peace.

* * *

We have amply demonstrated our ability to harness the vast productive capacity we possess. Why cannot these resources, which we have organized so efficiently for the destruction of life and property, be directed toward the destruction of the causes of war?

May not the patriotic and emotional strength and the unity of action which have been stimulated for the purpose of winning the war be directed, at least equally well, toward the attainment of world peace and international harmony?

If they are not so directed, what lies ahead but another war? And how can America, in a world that is so rapidly shrinking in size, avoid involvement in ***any*** of tomorrow's conflicts?

International peace is an ambitious dream and its price is high, but the price of war is even higher. Our world cannot long survive the periodic waste of its human and material resources.

Our country can be the most potent single force in bringing about the international understanding that leads to peace, in developing the unity that will make the most of the ample resources nature has provided everywhere.

* * *

There is no unity in selfishness. There can be no unity if any one of the great powers fails to do its part in determining and eliminating from the world the basic causes of aggression.

These basic causes stem from greed and the suppression of opportunity for individual progress; for self-preservation is the first law of nature.

Mussolini's dramatic march on Rome in 1922 was made possible by disillusioned veterans of World War I who could find no jobs and whose future held no promise. Some of Hitler's most

determined followers came from the same ranks.

Men denied the opportunity to make a living, for themselves and for their children, are easy prey to false doctrines and dangerous "isms."

In any realistic appraisal of our domestic problems—economic, labor, racial—it is clear that we can solve them, not by waiting until we reach some utopian accord, but by making a series of compromises. We do this because we know how discord can impair the very roots of private enterprise, self-government, and self-discipline—the essentials of a dynamic democracy.

Similarly, peaceful reconstruction of our world economy depends on the ability of nations to reconcile their differences in a series of working agreements.

If we in the United States want lasting peace and if we want to preserve our democratic way of life, we must take over our full share of the task of initiating these compromise measures. Acknowledging our inescapable responsibility as the greatest economic and military power in the world, we must attempt to insure the free flow of world trade, and develop—with profit for both parties—backward areas abroad as well as at home. And we must do this by making all nations share the responsibility, not by allowing ourselves to be manoeuvered into being an international Santa Claus.

With our allies, we will have to see to it that the devastated portions of the world rehabilitate themselves as quickly as possible; that practicable and realistic trade and economic relations between nations are developed; and that the energies and productive capacities of these nations are set free to function in a climate that is favorable to the growth of free enterprise and individual initiative. As the most powerful economic force on earth, we have the most to gain and the most to lose at the peace table; and we must never forget that with our power comes responsibility.

We cannot hope to solve all of the problems of all nations—nor even all of our own—but our way can become the way for more of the world's humanity. Our strength can become the guiding spirit of the smaller nations.

* * *

In the development of a sound American foreign policy, let us take care not to attempt to control the destinies of other nations. Let us remember that we must set the example of self-determination of independent, free peoples.

Freedom is essential to international peace; and free competition—whether it be between individuals, between businesses, or between nations—is the mainspring, the synchronizer, and the preserver of freedom. For competition always is synonymous with private enterprise.

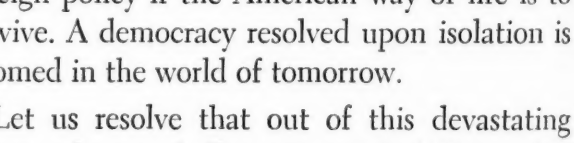
We are not a covetous nation. We have no territorial ambitions. Our international commercial aspirations are dominated by the conviction that we have a great stake in world unity and world prosperity. We know that we can no longer live apart from other nations and that we cannot ignore the fundamental elements which affect the well-being of other countries.

Our foreign policy must encompass a world of trade, and help develop it.

We dare not blunder in the execution of that foreign policy if the American way of life is to survive. A democracy resolved upon isolation is doomed in the world of tomorrow.

Let us resolve that out of this devastating catastrophe we shall emerge with fuller understanding and greater determination to build the kind of world which can materialize only if this country has the vision and the will to see it through.

We still are free to decide our own fate—still free to shape our own future. We still are free to preserve the liberty and happiness that has made our country the hope of the world.



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Postwar Preparations—X

Distribution Problems and What They Involve

IN the jargon of business, no word is so much used or so misused as "distribution." It is employed to cover every phase of the operation of getting foods from the factory to the ultimate consumer. Many activities are involved in this operation, but all appear to fall within three broad categories: merchandising, sales promotion and distribution.

Merchandising and sales promotion are within the jurisdiction of the sales department. But distribution —the physical acts involved in getting the goods from point of production to point of final sale to the consumers—is in a very different category.

In the distribution function are such matters as choice of the system of successive owners of the goods that the manufacturer elects to utilize in his selling plans, which obviously is a responsibility of the sales department. It may involve the independent wholesaler-retailer combination, sales direct to chain stores or super markets, branch warehouse-retailer combinations, wagon jobbers, drop-shipments, deliveries direct to retailers by the manufacturer's own trucks, house-to-house sales, or any of many other possible methods. It also may involve decisions as to the size of stocks to be carried in various places. But, in addition to such matters, a multitude of physical problems are involved, about which the production department generally is far better informed than the sales department.

Here are some of those physical factors: proper warehousing, temperature and humidity of storage, method of packaging, the type of truck or truck body necessary to transport the goods economically and without spoilage or contamination. There is a multitude of similar matters, but one cannot review all the possibilities in a single page.

Are We Talking Same Language?

We bring this matter up because so many readers have written that postwar preparations must include a very wide consideration of distribution. We hasten to agree, but we want to be sure that we are both talking about the same thing.

When the research director of a concern that makes penny candies in peacetime asks for information on distribution, we wonder if he means what we mean? Is it possible that he hopes to learn how to produce a penny item that will shame the Pied Piper of Hamlin in attracting juvenile customers? Has the sales manager put up to him a problem that can be solved only on the basis of information that must come from the sales manager's bailiwick—like taste preferences, proper wrapping, number of pieces in a box? Is the production cost too high, so high that a competitor is able to undersell or overpromote? Has the sales manager muffed his own job (peacetime, of course) and put the burden of salvaging a bad situation on a man whose lack of experience in all that pertains to selling leaves him unable to discern that nice balance of function between manufacturing, selling and distribution? Has the sales department, with customary vigor, convinced everybody, including the research director, that the trouble with the company's sales lies in the goods, when as a matter of fact the trouble is right in the sales department?

These comments are not to be construed as detrimental to good teamwork, for any successful business must have all departments working for a common goal. But team play should work both ways.

I have known some sales executives, alas, who have continued to draw down salaries over $30,000 a year largely because of the painstaking efforts of an unsung food technologist getting less than $80 a week.

Five Things You Ought To Do

In this particular comment on distribution problems in postwar preparations, about all that may be done is to enter a plea to all branches of the food processing industry to do the following things:

1. Use the word "distribution" in its exact sense and not to cover matters that are purely merchandising, selling or sales-promotion activities.

2. Let sales departments be fair and reasonable in their relations with production and research departments, particularly when appraising responsibilities for success or lack of it, and in distributing the rewards for success.

3. Let technical and production men recognize that true distribution matters are largely in their own province rather than in the province of the lay or nontechnical personnel in the sales departments, despite the fact that sales will make most of the commitments and arrangements—often without previously asking for advice.

4. Let technical and production personnel learn to examine so-called distribution problems in a friendly but not unsophisticated manner to the end that their own contribution to the solution of the problems will be a proper utilization of their abilities.

5. Let technical and production men learn to be real business men so that they may be able to form critical judgments of their part in the job of making their respective companies succeed.

L. V. Burton

Editor

The Talk of the Industry

• The Food and Drug Administration is certain to proceed with very little change in policy under its new commissioner, Dr. Paul B. Dunbar. He is a veteran in this organization, having served in F&DA and its predecessor organization since the days of Dr. Harvey W. Wiley. Many present policies have been formulated by Dunbar.

Radical changes are likely to be few, except as new conditions develop under his leadership. So if you have been worrying about the future policies of F&DA, just relax.

• THERE is a new idea buzzing in the brains of the boys interested in frozen food lockers. It is a plan to put lockers in the basements of apartment houses, one for each apartment. Weekly deliveries of frozen vegetables, fruits, meat, poultry and fish—perhaps even frozen cooked foods—would keep the supply replenished. In sizable cities, such a development conceivably could become a factor of some importance in the food-distribution picture.

• THERE are two straws waving in the wind of an announcement that quick frozen chow mein is being produced by an ice cream manufacturer—Breyer, in Long Island City, N. Y. One straw points to the growing—if still insignificant—production of frozen cooked foods. The other points to the fact that ice cream manufacturers are not necessarily limited to ice cream, although as yet they have cut practically no ice in the field of frozen foods other than desserts.

• BELIEVING that the government demand for tomato products this year will cause a shortage for the civilian market, G. S. Suppiger Co. decided to boost tomato production on farms in its territory. The company's president, G. S. Suppiger, who also heads Illinois Canners Association, reasoned that if advertising could increase consumption of the company's food products, it also could increase the production of raw materials with which to make those products. So advertisements voicing patriotic appeals for more tomato production by farmers were placed in the rural newspapers. Then fieldmen contacted the farmers personally. Results—more tomatoes and another confirmation of the theory that it pays to advertise.

• ARGENTINA is reported to be making a strong bid for the postwar Mexican food market. According to the Mexico City Chamber of Commerce, agents of Argentine food processors are offering to sell Mexico large quantities of canned vegetables, dried fruits, condensed and powdered milk, spaghetti, noodles and macaroni. In return, they want coffee and manufactured goods.

Looks like we Lend-Leased ourselves out of this competition.

• MANUFACTURERS interested in postwar markets in the now neutral countries in Europe can influence international alignments while building good will for their products. Through OWI's overseas services, advertisements can be placed in those publications in the neutral countries which want to carry news favorable to the Allies provided the publishers can make a living doing it. Publishing ethics in Continental Europe are not what they are here. If you advertise, your news items will be published—no ads, no news about you, your product or your country. German advertising sometimes is placed with these papers with the understanding that the ads may be left out so long as the "news" stories sent in with the ads get into print. There's more than one way to fight a war.

Hors d'Oeuvres

• No coffee, no overtime, declared the union workers at one of Bethlehem Steel Co.'s shipyards, in a recent labor dispute. You can't say that organized labor isn't helping one food industry.

• *Whole milk preserved for four weeks by freezing was served to wounded soldiers returning on the hospital ship "Chateau Thierry." When thawed, the milk was as fresh as ever, with no increase in bacteria count. It was as big a hit with the soldiers as "Mairzy Doates," which is to say that it was in the groove.*

• In the manufacture of penicillin, corn steep liquor and lactose are used to feed the mold. Dubbed "mold gold" because $20,000,000 worth of plants produce only 9 lb. a day, the wonder drug is a double-barreled benefit to food manufacturers. It must itself be fed, and it keeps more people alive who must be fed.

• *Here's a bit of dry wit from the "Army and Navy Journal": "Two American soldiers in Egypt lived for months on dehydrated beef, dehydrated milk, dehydrated butter and dehydrated vegetables. Visiting a Cairo museum they saw their first mummy. 'This is going too far,' said one. 'Now they're dehydrating women'."*

• To lubricate the engines of its fishing fleet, the Swedes make "motor oil" from tree stumps. In at least one respect they have the Nazis stumped.

• *Long rivals as to citrus fruits and climate, Florida and California now are arguing as to which produces the fish liver oil most potent in vitamin A. Such debates give people in other states a pain where a dose of oil won't reach.*

• In three days of oratory at the convention of the Antisaloon League of America, not a single voice was raised in support of wartime prohibition, the Bryson Bill or Senate Bill 860 calling for prohibition in and around army camps and war plants. Shades of Carrie Nation!

• *Up in Maine the sea gulls feed on the blueberry crop in July, and frightening devices and shooting are not very effective in keeping them away. So add sea gull control to the list of food problems.*

• A five-sided candle of high melting paraffine and wood flour is used to heat cans of "C" and "K" army rations. It burns with a hot flame, on all five sides as well as the top. Another way to give canned beans the hot foot.

• *Mussolini, reports Borden's "Milky Way," is convoyed by a cow, as Hitler's personal physicians want him to drink plenty of milk. Il Duche! The great Moo-solini!*

• The war has forced Norwegians to fry potatoes in cod liver oil. You said it, General Sherman, it is hell. F.K.L.

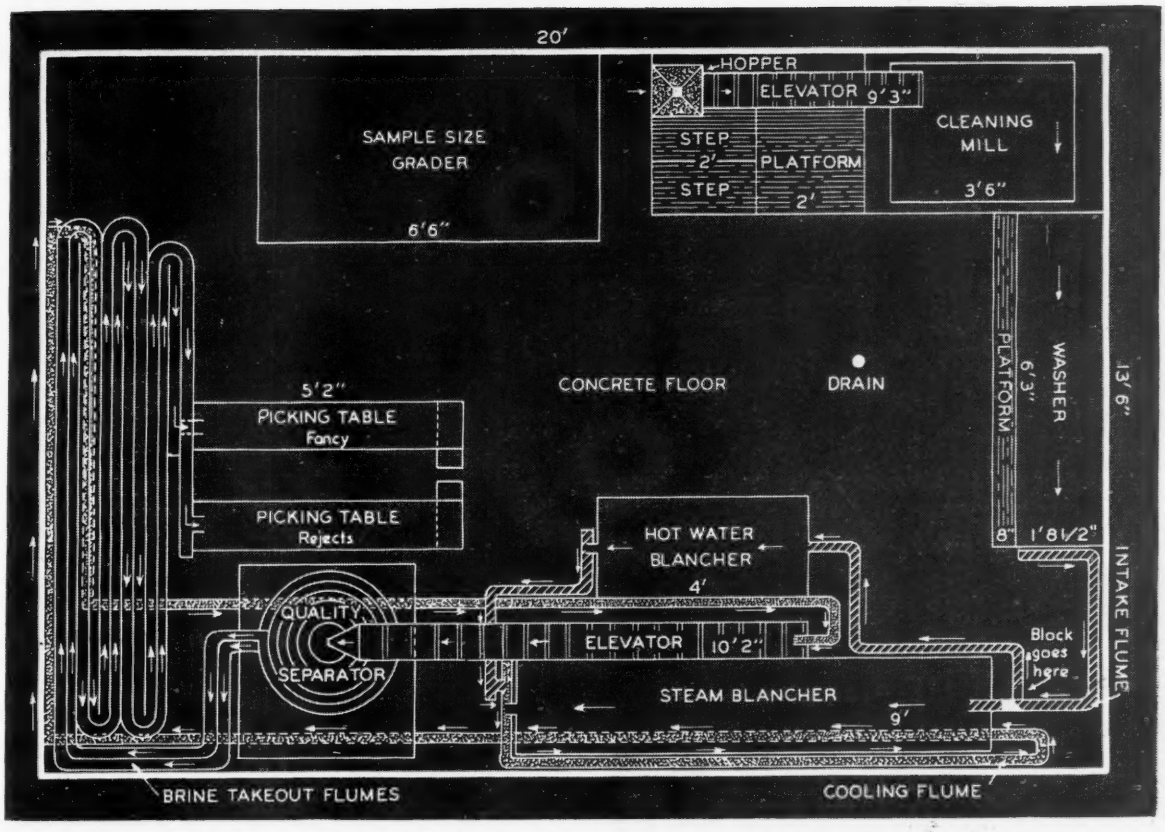


FIG. 1. Floor plan of quick-freezing pilot plant, showing arrangement and size of the equipment. The process starts with the sample-size grader. The subsequent steps include: elevating to cleaner, cleaning, washing, conveying by water in flume to a hot-water blancher or a steam blancher, blanching, conveying (and cooling) in water flume to elevator, elevating to quality separator, separating, conveying by separate desalting flumes to picking tables.

Research on Production Basis

Miniature Birds Eye factory, with machines one-eighth the size of production units, permits research under factory conditions

By A. I. NELSON, J. T. R. NICKERSON and C. F. EVERS,
Birds Eye-Snider Division, General Foods Corp., New York, N. Y.

RESEARCH men working in the field of quick freezing have had, for a number of years, a growing need for pilot plants with which to apply factory conditions to the running of laboratory samples. There are many reasons. Consider, for example, the requirements of vitamin studies and investigations into the loss of soluble solids in vegetables. Before such studies can contribute worthwhile findings, they demand an exacting uniformity of preparation which can be translated into terms of practical production. Then, again, satisfactory studies of the various steps in preparing and processing the vegetables prior to freezing can be conducted only under pilot-plant or factory conditions.

It has been practically impossible to utilize large freezing plants for most research problems during packing periods. Therefore, many important research studies have had to be made with makeshift equipment for cleaning, washing and blanching the products. Very often, the factory has had to be used at odd times, such as lunch periods, when it was not busy with production operations. These methods

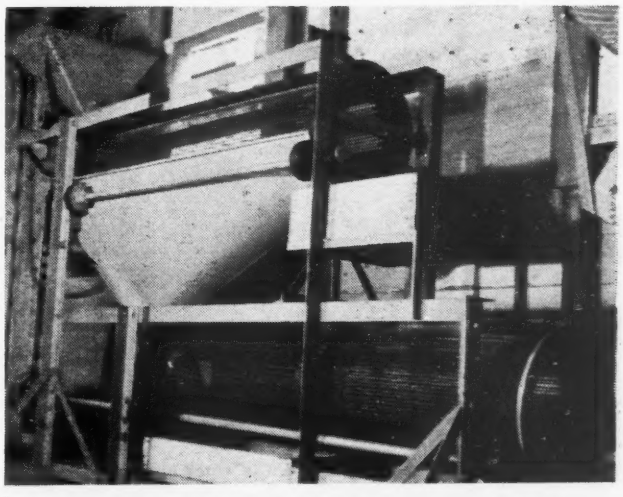


FIG. 2. Berlin-Chapman sample-size grader in which first step of preparation process is carried out.

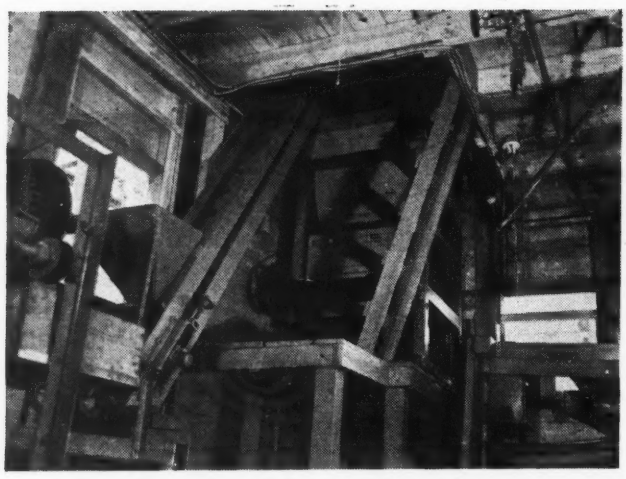


FIG. 3. Elevator takes product from grader to cleaning mill shown at center

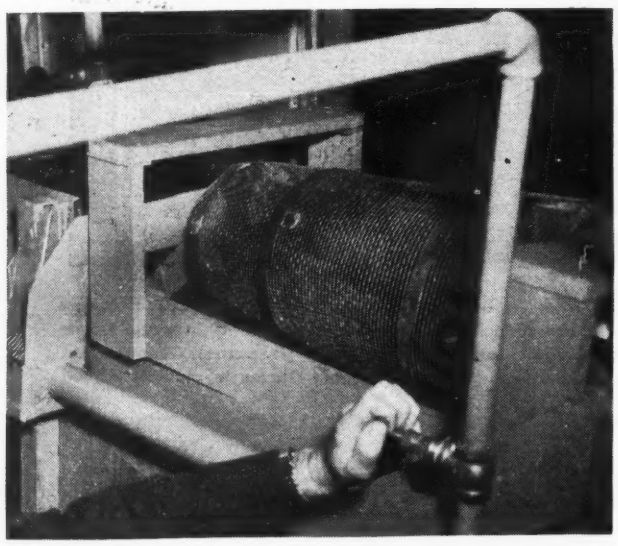


FIG. 4. After leaving cleaning mill, the product passes into a miniature washer similar to the Olney type pea washer.

FIG. 5. Water in a flume conveys the washed product to a hot-water blancher or a steam blancher. Hot water blancher is shown here. One of the authors, A. I. Nelson, stands beside the blancher to show its relative size.

not only have been costly and time consuming, but more importantly, they have been inaccurate. The preparation of samples of seasonal vegetables for research always has been a major problem because of the time required to complete such experiments during the busy season. And adjustments of the machines, necessary to govern the processing procedure when running small sample lots, has never been feasible during a regular processing operation.

That the industry has continued to gain new knowledge of the nutritional and technological aspects of quick freezing in spite of these difficulties is a tribute to the ingenuity of the research men in the field.

It was with these facts in mind that the authors, aided almost entirely by laboratory help, constructed last year a Birds Eye pilot plant for research on quick frozen foods. The miniature factory adjoins buildings of the Birds Eye-Snider division of General Foods Corp. at Houlton, Me. Water, steam and electricity are supplied by this plant.

Virtually every one of the difficulties encountered in laboratory research on quick frozen foods has been eliminated in this Birds Eye pilot plant. The preparation of samples for processing does not differ from methods used under the high pressure of peak production. The plant shortens the time involved in running experiments. It is extremely maneuverable with regard to the adjustment of various machines for variations in processing procedure. Samples in lots as small as 1 lb. have been run on many occasions. The results obtained from such small amounts, which would be lost in anything other than a pilot plant, are easily convertible into terms of factory production.

The Birds Eye pilot plant also has other potentials. The scope of its research possibilities is almost unlimited. Take, for example, the question of hot water versus steam blanching. Though many articles have been published on this subject, research in a pilot plant would yield information that cannot be determined in ordinary laboratory studies. Moreover, the miniature factory offers an opportunity for unlimited investigation into quality separation, hitherto impossible to study completely because of limited facilities. Problems inherent in quick freezing—from the time the raw product is delivered to the factory until the finished product is in the package—will find their solution in this tiny, controllable processing plant.

The Birds Eye pilot plant was designed primarily for experiments on peas and lima beans. However, green beans, corn and peaches also have been processed. Other products, such as asparagus, spinach and broccoli, may be prepared for freezing in the miniature factory. The equipment is identical with regular factory equipment, except that it is one-eighth the size.

Layout and Equipment

The floor plan and the location of the equipment is shown in Fig. 1. The building is 20 ft. long by 13½ ft. wide and is of wood construction. Preliminary plans called for a structure twice as big, but this size has been found adequate. The concrete floor is sloped toward one end, where a 4-in. drain is located. That part of the floor not required for equipment is covered with floor racks constructed from boards 1 in. by 2 in. The equipment includes a sample-size grader, an elevator which lifts the peas into the cleaning mill, a cleaning mill, a washer, a steam blancher, a hot-water blancher, an elevator which lifts the peas into the quality separator, picking tables and flumes.

The Berlin-Chapman sample-size grader is shown in Fig. 2, and its location in the pilot plant, along with the other equipment, is shown in Fig. 1. These sizes of peas can be obtained from this machine: No. 6's and over, No. 5's, No. 4's and No. 3's and under.

Several pieces of equipment are shown in Fig. 3, including the elevator which lifts the peas into the cleaning mill. This elevator has a wood frame. The canvas belt, 4 in. wide, is equipped with wood cleats spaced 6 in. apart. The side of the cleat which carries the peas is hollowed out to facilitate holding the peas on the cleat. Wood guides along the outside of the cleats prevent the peas from being crushed.

The cleaner, which is a No. 0 mill, also is shown in Fig. 3. Since the samples usually are not large, and the pilot plant is operated only while running the samples, this small cleaner does an excellent job. It is powered with a 1-hp. electric motor which runs the fan at 850 r.p.m. The cleaner is placed at such a height above the floor that peas discharging from it flow by gravity through the washer, either blancher and the cooling flumes.

The miniature washer is constructed somewhat similar to the latest model of the Olney type pea washer, as shown in Fig. 4. The body of the washer is constructed of No. 22-gage sheet metal and the reel is covered with ¼-in. galvanized hardware cloth. The framework is of wood construction, and the body of the washer is approximately 15 in. wide, 15 in. deep and 35 in. long. The reel is 36 in. long, with the diameter of the cone tapering from 12 in. to 8 in. at the intake end. Under the reel is installed a sump into which the water drains.

The pump on the washer has a 1¼-in. inlet, a 1-in. outlet and a 2,100-gal. per hour capacity at zero head when driven at 1,725 r.p.m. The pump is operated, however, at about 1,200 r.p.m.

The flume in which water carries the peas from the washer to the blanchers is shown in Fig. 1. A wooden block can be inserted in the flume to divert the peas to either blancher.

The design of the hot-water blancher in Fig. 5 is similar to that of commercial rotating water blanchers. It is 48 in. long, 22½ in. wide and 25 in. high. The spiral which forces the product through the blancher is 14 in. in diameter, and the outside shell is about 20 in. wide. The water in the blancher is heated directly by steam supplied through a ½-in. pipe perforated with holes of ⅛-in. diameter, this pipe being placed under the blancher spiral.

The steam blancher is shown in Fig. 6. This piece of equipment is constructed almost entirely of wood, since metal was difficult to obtain, the framework and the steam box both being of wood. A sheet-metal lining in the bottom of the box drains off the condensate. The metal mesh belt, 12 in. wide, is closely woven. Inside the steam box, the mesh belt is 9½ in. wide since guides are installed along the sides to prevent crushing of the product being blanched. The pulleys used on this machine are of wood-faced, metal-flanged type and are 12 in. in diameter. The diameter of the flange is 18½ in. A flange-type pulley, though not absolutely necessary, is desirable, since the flange keeps the belt running straight. The overall length of this machine is 9 ft., the overall width 23 in., and the depth 15 in. at the deepest point.

After blanching, the product is cooled in a 60-ft. flume which is 2 in. wide and 3½ in. deep. (Fig. 1). The elevator located at the end of the cooling flume, to lift the peas into the quality separator, has a 6-in. rubber belt. Its frame, which is entirely of wood, measures 8¾ in. high, 11 in. wide and 10 ft. 2 in. long. (See Fig. 6)

The quality separator (Fig. 6) is modeled after the Chisholm-Rider type quality grader. There are three main parts to this separator: the spiral in which the brine carries the peas being separated, the brine sump and the pump for recirculating the brine. The spiral is made from 26-gage sheet metal and the center of the base of the spiral is

(Turn to page 118)

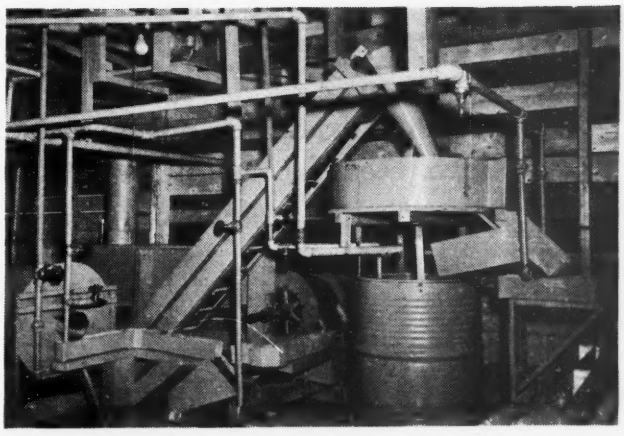


FIG. 6. Several pieces of equipment are shown in this picture: at left is end of hot-water blancher. At right on same level is steam blancher. Part of cooling flume into which blanchers discharge is in lower foreground. At center is elevator which conveys product from end of flume to quality separator (a brine flotation unit), the separator being under upper end of elevator.

FIG. 7. Quality separator discharges "fancy" and "reject" peas into two separate parallel flumes which extend from background of picture to foreground and back three times and discharge their respective grades of product onto "fancy" and "reject" picking tables, or belts. Salt is washed from the product in these flumes.

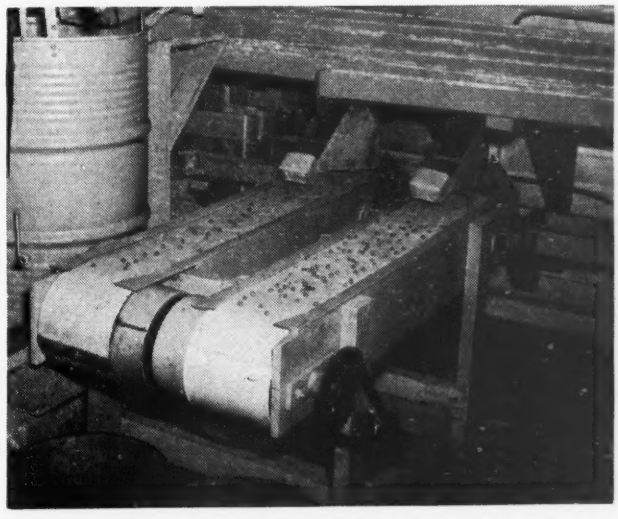


FIG. 8. "Fancy" and "reject" picking tables onto which two grades of product are discharged from flumes.

What's Ahead for Frozen Foods

Wartime expansion has increased production and consumer acceptance, creating new potentials for progressive packers. But closer integration of production and marketing is required in the future

By C. R. HAVIGHORST, Assistant Editor, San Francisco

LIKE a snowball rolling down a steep hill—and about as easily, too—the frozen food industry has expanded its production output during the past two years, encountering less than normal competition from other processed foods because of wartime shortages. Because overseas shipment was impracticable, frozen foods stayed at home. And, here at home, these foods have been favored with low ration-point values; a buying public oversupplied with dollars; high-priced and often poor-quality fresh produce; a scarcity of other processed foods and government contracts (1943) for over 100,000,000 lb. These and other factors have given the industry a 10-year growth during the past two years. (Fig. 1.)

The amazing growth of the quick freezing industry also is evidenced by the increase in the number of plants. In 1930, there were some 30 quick freezers, most of which were freezing fish (FOOD INDUSTRIES, April, 1930, page 188). Today, there are well over 400 plants producing a wide variety of quick frozen foods (Fig. 2). New plants are being built, others are being planned. And some canners and dehydrators apparently will add freezing to their present operations or build new frozen food plants in the near future.

The frozen food snowball, however, is destined to stop its easy rolling. So it is time for forward thinking, for an appraisal of the coming era and the evaluation of new methods of production, new machines, new products, potential markets and merchandising technics. But the most important need of all is a study of how to correlate all these factors into sound program for a flexible postwar plan.

Markets for frozen foods can be broken down into three general classifications: (1) Industrial, such as ice cream and jam and jelly manufacturers; (2) institutional, including restaurants, hotels, clubs, hospitals and such; and (3) retail, composed of the retail stores and perhaps, in the future, including house-to-house delivery.

The mechanics of reaching any of these markets has not changed appreciably during the past two years. Refrigerated trucks and cars have moved frozen foods to their markets. Cold storage warehousing has become, and probably will remain, a serious problem until the stockpiling of refrigerated foods declines. But the wartime expansion of low-temperature warehousing facilities will provide sufficient space for the storage of frozen foods at the outset of the postwar period.

The cold storage warehouse is the divergent point in the distribution of frozen foods, for it is here the merchandise is channeled to the three markets. The industrial market usually makes immediate use of frozen foods taken from either public or private cold storage warehouses and presents no further problems. But there are numerous problems ahead involving the use of low-temperature facilities in distribution and storage in the institutional and retail (and consumer) markets. These can best be solved by close cooperation of the frozen food and refrigeration industries.

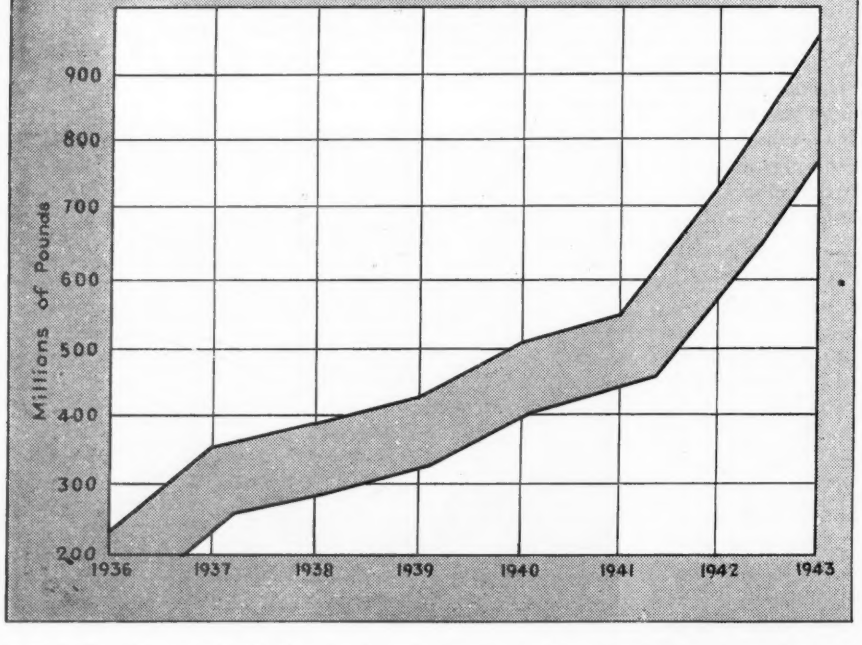


FIG. 1. Rapid growth of frozen food production in past two years is shown by this curve from the 1943 Frozen Foods Directory ("Food Industries," November, 1943).

Better Quality Control

Marketing experts point out that frozen food prices must follow future wage curves. This means that future prices must become low enough to create an "everyday demand"—not just holiday or Sunday-dinner use. As in any other industrial field, to meet this challenge, frozen food packers will need more scientifically trained men. A great deal of the scientific work done, so far, has been accomplished by the USDA research laboratories and State experiment laboratories. But in every industry a point eventually is reached when it is imperative that trained men be employed. These men are needed to refine production methods and products, reduce processing costs and, through research, develop new products. The progressive frozen food packer, aiming at successful postwar operation and expansion, will plan now to install his own scientific research and quality control department.

A progressive industry experiences cycles of changes in production, distribution and marketing as it expands.

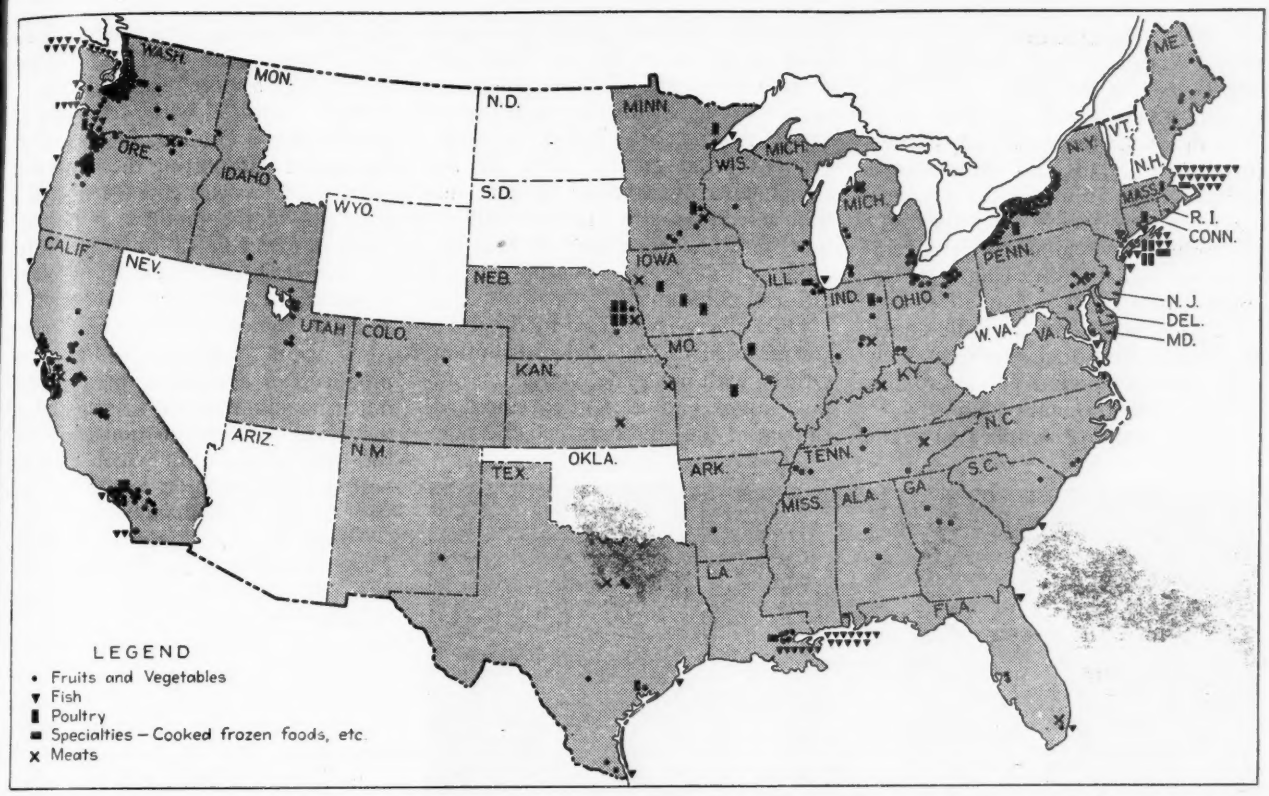


FIG. 2. A close count indicates there are more than 400 packers freezing fruits, vegetables, fish, poultry, meats, cooked foods and specialties. This map shows where they are located and what they produce.

Heretofore, a successful frozen food packer-distributor-retailer set-up required a full line of products (at least of fruits, berries and vegetables) under one brand. This necessity was born of conditions which involved the packer's production, sales volume, shipping and marketing problems; the distributor's source of supply, sales volume and marketing problems; and the retailer's need for an available supply of all items, small sales volume (which was too small to be divided between two distributors), and so on. Full lines of frozen foods (under one brand) will be marketed in the future, but the past two years have seen many of the above problems change. Now, although they may feature one brand, distributors and retailers frequently sell several brands.

There are several reasons for this change, the most significant of which is a shortage of supplies. Distributors have found it necessary to go far afield to obtain sufficient quantities of merchandise to supply growing demands. In so doing they have found it possible to operate on a basis similar to that existing in the distribution of canned foods, in which multiple brands are bought and sold.

This same change has been reflected in some frozen food packer's production plans for the future. The knowledge that distributors will buy from a number of packers, instead of only one, and the fact that the determining factors of cost, maximum production and quality of packs are controlled largely by the abundance and quality of produce grown in any region indicate that a packer can process and sell a certain few products instead of a full line.

New Products

Until recently, finished frozen food products were essentially unchanged from their original form, when they were harvested from the fields and orchards or taken from the sea. However, refinements and combinations of these original products are now on the market and are creating consumer demand.

Lower production costs for some items are indicated in the more efficient utilization of culls and grade rejects, which will influence primary costs through a higher percentage of recovery of finished product from the raw material. Fruit and berry purees will, in all probability, lead in this field.

Cooked frozen foods are among the most interesting of these new products. They are edging their way into retail and institutional markets and are being produced now in over half a dozen plants. Appearing in retail packages are new combinations of fruits and vegetables, which already have met with good consumer reaction. The USDA Regional Research Laboratory at Albany, Calif., has perfected a new method of processing an overrun frozen fruit dessert, which is called Velva Fruit (Fig. 3) and which utilizes frozen fruit or berry purees for its base and flavor and requires no milk solids in its manufacture.

These new products are evidence enough that there is still considerable latitude for the refinement of present-day frozen foods and the development of new products.

Refrigeration and Processing Machinery

Refrigeration in the processing, shipping and storage of frozen foods presents one factor that seems unlikely to undergo an appreciable change in the future. Public cold storage freezing space has been expanded greatly in the past two years, with an estimated 90,987,000 cu. ft. now available as compared to 50,118,000 cu. ft. reported for January, 1940. Since prewar occupancy by frozen foods averaged approximately 40 percent of the available freezer space in warehouses, this increased space should accommodate the expanded output of the frozen food industry.

As in all other industries that engaged in all-out production during the labor shortage, frozen food plants have become much more highly mechanized. From these mechanical innovations will come many new and refined methods of processing and materials handling.

Distribution

Plant location with reference to markets, transportation facilities, shipping rates, low-temperature storage facilities and the availability of low-temperature retail and institutional cabinets greatly influence the distribution of frozen foods. The necessity for constant low-temperature refrigeration is a cumulative cost factor, for the longer frozen foods remain in storage the more storage cost must be added into their selling price (approximately 0.025 cent per pound per month for retail and institutional packages).

There is nothing complicated in the distribution channels used for frozen foods, as shown in Fig. 5. True, the distributor may find it necessary to handle chain-supermarket distribution differently than distribution to independent retail grocers. But all the components necessary to efficient distribution, especially that of refrigeration, must be correlated so that the product will move smoothly to the ultimate consumer.

Only a very few frozen food packers are prepared for national distribution. Others, with moderate production output, might find it more to their advantage if they discontinued the practice of distributing their product thinly over a large territory and, instead, concentrated in a more restricted area.

Plant location with reference to markets has a bearing, of course, on the cost of transporting the product to the market. As this cost is reflected in the price of the product, it becomes either a favorable or unfavorable factor in competitive selling. Cost of production may vary and tend to equalize, somewhat, the selling prices. Also, plants located in an area which produces an abundance of a product not generally available to other plants may find a strong national demand for their product, in which case the cost of transportation factor is secondary to that of demand.

While adequate freezing warehouse space is indicated for the postwar future, the bottleneck resulting from a shortage of institutional, retail and consumer low-temperature cabinets still must be eliminated. This bottleneck seriously impeded the expansion of this channel of distribution in prewar days. Rumors concerning the manufacture of these cabinets by several larger corporations now seem to be culminating in the actual production of units on a very small, wartime basis. But even after this production has been greatly expanded, there is the job of quickly selling and distributing the cabinets in the regions in which each packer has his most favorable current and potential future markets. This calls for cooperative planning and effort on the part of the frozen food packer and the cabinet manufacturer or distributor.

House-to-house delivery of frozen foods has merit. But such a service must include an increased distribution cost which, when reflected in the consumer's price, may make the plan competitively unsound.

Consumer low-temperature cabinets undoubtedly will be sold much as refrigerators were sold in prewar days—through household appliance distributors. Packer's forward plans should give serious consideration to methods of accelerating the sale of home-size units, because the investment in such refregerators implies intentions to use frozen foods in quantity, which in turn provides larger unit sales for retailers and is reflected all through the distribution process back to the packer.

The expansion of the locker plant industry must be evaluated carefully, for it undoubtedly will continue to bring changes in the distribution of commercially frozen foods in rural and suburban districts.

Chain stores and supermarkets not heretofore interested in the sale of frozen foods are evincing strong in-

USDA Photo by Allison

FIG. 3. Two kinds of Velva Fruit, frozen fruit dessert—apricot (left) and raspberry (right). In back are amounts of fruit puree (left), sugar (right) and gelatine and water (center) required to make enough Velva Fruit to fill the paper cups shown.

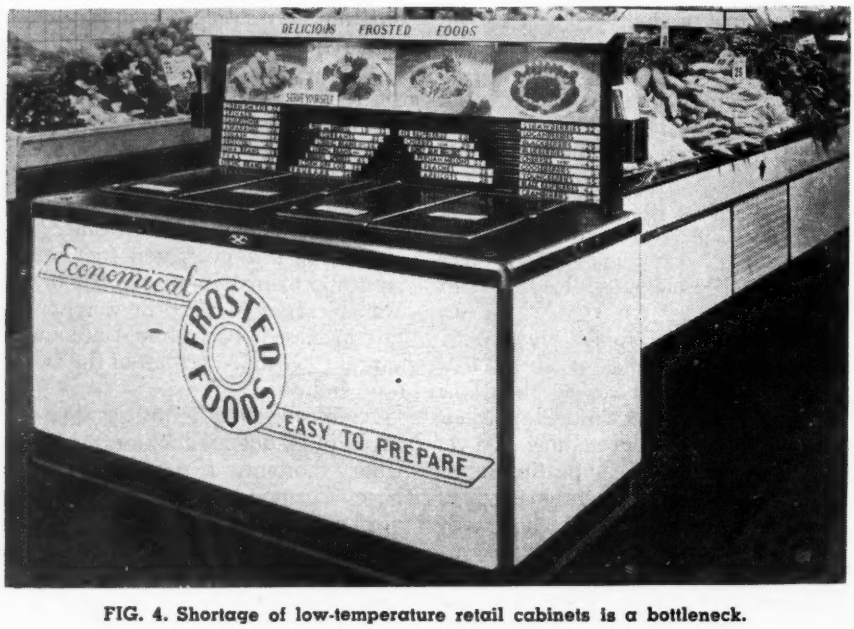


FIG. 4. Shortage of low-temperature retail cabinets is a bottleneck.

dications that they intend to market these products, judging from their inquiries for sources of supplies. In the majority of instances, it would be economically dangerous for the average packer to plan to act as a sole source of supply for these large retail outlets. However, they have a definite value and place in every distribution arrangement and should be included in future programs, for these outlets are the final key to mass distribution.

Distribution Costs

Wholesale distribution to retail stores and institutions, which now accounts for an additional 17 to 25 percent added to the packer's price, should find in increased sales volume, in less frequent and larger deliveries, economies that will permit some reduction in this gross margin. Larger retail cabinets, back-room storage boxes and large institutional storage units should enable the distributor's customers to phone regular weekly orders. This would permit the substitution of ordinary truck delivery where driver-salesmen are employed and account for an obvious saving. When this change occurs, there will be a need, of course, for a certain number of specialty salesmen, usually employed by, and under the direction of, the food processor. This type of sales force is essential in the distribution of canned foods, and all indications point towards its use in the frozen food industry.

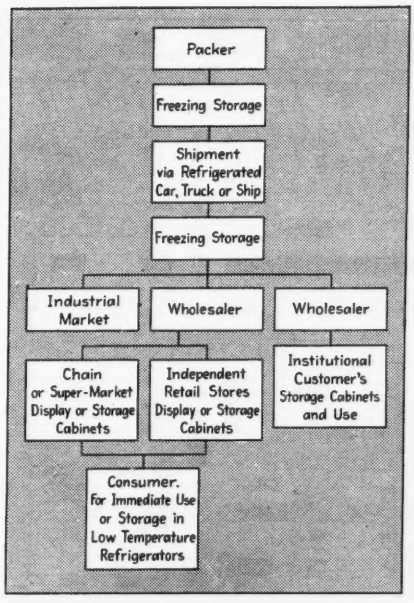

Packer
Freezing Storage
Shipment via Refrigerated Car, Truck or Ship
Freezing Storage
Industrial Market
Wholesaler
Wholesaler
Chain or Super-Market Display or Storage Cabinets
Independent Retail Stores Display or Storage Cabinets
Institutional Customer's Storage Cabinets and Use
Consumer, for Immediate Use or Storage in Low Temperature Refrigerators

FIG. 5. Frozen food packer's distribution flow plan

The average retail gross margin of at least 25 percent has, in the past, allowed retailers a fair profit on a comparatively small sales volume. There are several factors, however, which will tend to increase the retail sales volume in the future. Foremost among them are: (1) A continuing increase in consumer demand for frozen foods; (2) modern merchandising methods, used by the big-volume retail outlets, which will tend to reduce the retail prices and to increase sales volume; (3) larger and more efficient low-temperature retail cabinets; (4) low-temperature cabinets for consumers, and (5) more and more advertising of frozen foods.

Marketing

Markets are people and dollars. They are very much alive and are continuously changing. In the development of our wartime economy, these changes were accentuated until now some markets have appreciably shrunk while others have grown in size. Today, there are markets for frozen foods that did not exist prewar, and in only a few markets have sales declined. Shifting populations have altered food markets (see FOOD INDUSTRIES, May, 1944, page 102). A high rate of employment has increased consumer demand. Although there will be further population shifts and changes of employment, most regions are now making plans to hold as many of their new residents as the industrial economy of community will support in the future.

Since under the existing national economy the majority of people have dollars to spend, it is only necessary to look for those areas that are most heavily populated to find good markets for frozen foods. Figure 6 graphically portrays the concentrations of population in the country. It shows that approximately 70½ millions, or 55 percent, of the total civilian population lives in 241 counties comprising

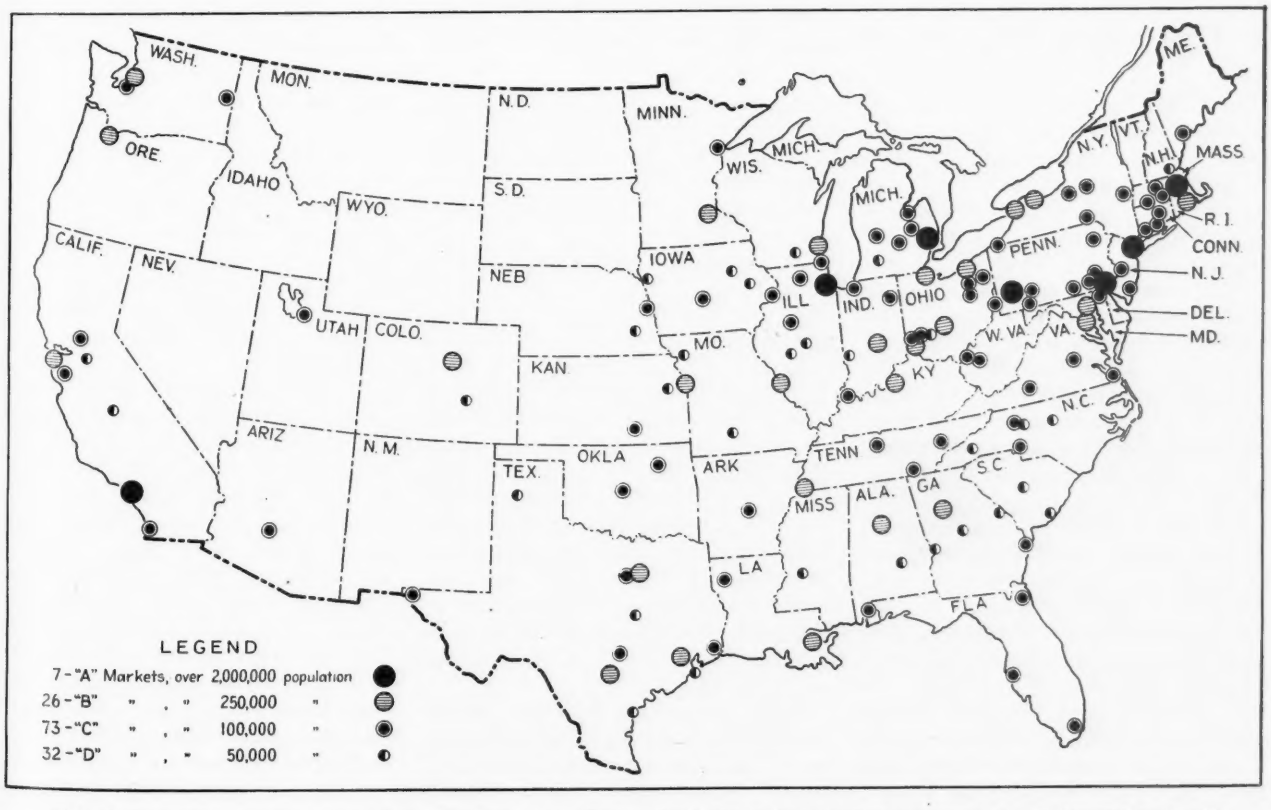
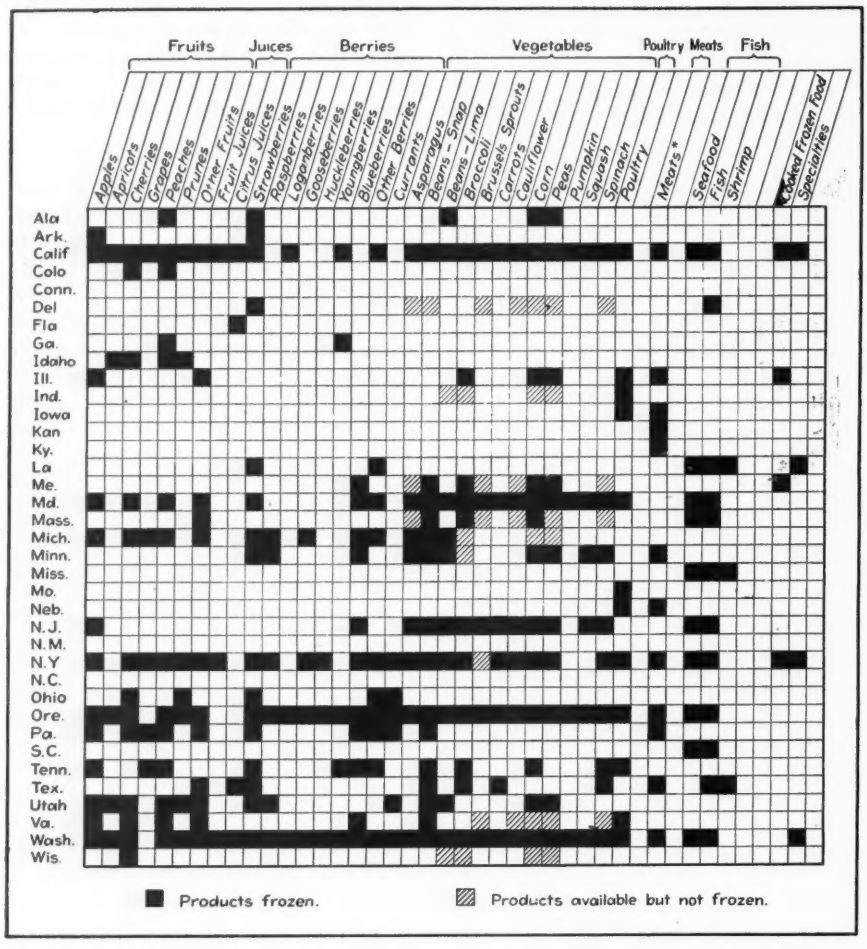


FIG. 6. Population survey, taken from registrations for Ration Book No. 2 by J. Walter Thompson Co. ("Advertising Age").



*Meats—Under present wartime restrictions it is doubtful if output is large.
Poultry—Includes chickens and turkeys.
Seafood—Includes crab, oysters, scallops, clams, lobster, eels, smoked fish, etc.
Fish—Includes over 37 varieties of fish.
Cooked frozen foods—Includes all foods cooked then frozen.
Specialties—Includes frogs legs, ducklings, squabs, pheasants, etc.

FIG. 7. Raw materials are available, and frozen foods are packed, in these states.

the 138 metropolitan markets of over 50,000 population. The other 2,832 counties represent about 45 percent of the remaining markets. This survey indicates that in 1940 the metropolitan markets had 51½ percent of the total population, which clearly portrays the magnitude of wartime migration. Compare the map showing the number and locations of frozen food plants (Fig. 2) to this map of the 138 metropolitan markets. Such a comparison shows the proximity of competitive packers' plants to markets affording greatest potentials for future and present frozen food sales.

All these regions, of course, do not produce identical kinds and varieties of fresh produce, meats, poultry or fish. Abundance and quality are two of the foremost factors of efficient, economical production. Lacking these in adjacent areas, the metropolitan centers will be forced to reach farther afield for their supplies of frozen foods. Then, too, it must be considered that the bulk of the markets are located east of the Mississippi River, and frozen food consumption in this area has, in the past, often exceeded production. This means that potential opportunities have existed in these markets for Western packers and probably will in the future.

To complete a *preliminary* market analysis of any area shown on these two maps is a simple procedure. Choose the area from Fig. 6 (metropolitan markets), compare it with Fig. 2 (the number and location of frozen food plants), then add to this study a consideration of Fig. 7, which shows the kinds of frozen foods processed in these areas. Include, in this study, data concerning the abundance, time of harvests, varieties, quality, and so forth, of competitive products processed in the area. Information of this type, currently up to date, may be obtained from the U. S. Department of Agriculture.

Such an analysis, however, is only the *starting point* for a marketing program. After ascertaining what markets seem most favorable, a packer should make a concentrated survey of the market to develop a clear picture of existing or potential competitive factors. These factors include existing competitive prices for frozen foods, competitive brands already firmly entrenched in the market, percentage of per capita users of frozen foods in the market, transportation costs and a myriad of other distribution and marketing problems that can be brought to light only by careful market survey. The development of a comprehensive and complete distribution and marketing program is the function of experienced merchandising men or agencies, though some physical problems may be involved which require the council of production men or technologists.

It seems that regional marketing of frozen foods is the method indicated for the average packer. Many factors enter into this, most significant of which are: (1) The geographical location of the majority of frozen food plants; (2) kinds of foods frozen; and (3) size of production and output. As the phrase implies, regional marketing means the selection of certain regions (or region) in which the packer will concentrate sales, distribution, merchandising and advertising efforts. The number of packers who could contemplate a national sales and advertising program may be counted on the fingers of one hand.

There is, nevertheless, a need for more national frozen food advertising programs of the general consumer-education type. One national advertiser can convince only a certain number of people of the goodness, economy and ease of preparation of frozen foods and, at the same time, entrench his own advertised brand in the reader's mind. Riding on the advertising tailgate of another advertiser is a dangerous marketing fallacy. A few frozen food packers are beginning to realize this, as is evidenced by an increasing number of regional newspaper advertising programs carrying packer's brand names.

It certainly doesn't take a supernatural conception of postwar marketing to realize that every frozen food packer will be fighting for his place in the sun. No holds will be barred, for the normal food distribution floodgates—which have been wholly or partially closed due to wartime food emergencies—will be thrown open. The resulting deluge of other processed foods of high quality and low prices will create competitive factors that have been more or less latent in the past two years. Now is the time for individual packers to entrench their brands in regions most favorable to them.

THAT EXTRA SOMETHING

There is need for an overhauling of formulas to get individuality into the products of the manufacturer who wishes to emerge from the crowd. Products with that extra something ought to be part of postwar plans

By LABOUCHE CHEVAL

TECHNICAL research has brought about some highly significant changes, and equipment engineering has made surprising results possible in food preparation in the past 25 years. But there are yet some blind spots in the field of food manufacture and processing to which the light of technical progress has reached only dimly, if at all. To a very large extent this delayed progress has to do with the absence of individuality or personality of product, distinctiveness of flavor, palatability and finish in workmanship that could be translated into higher profits in peacetime as well as into an increased market demand by a discriminating consumer public.

Examples of what can be done by appealing to a discriminating market with superior quality food are illustrated by a wholesale baker whose pies are in demand, even at increased prices, in the restaurants of a big city where competition is merciless; by a large candy manufacturer whose retail outlets do a brisk business in spite of high prices. There are other isolated cases where the manufacturer makes a business of giving the customer what he wants even at an increased cost to the customer. In each case the finished product has an individuality, a palatability and a finished workmanship that has set it apart from the products of other manufacturers in that particular field. The discriminating peacetime consumer wants that "extra something" even though he has to pay extra for it.

These observations have a general application. My personal experience has qualified me to speak in particular about conditions in the meat packing industry, but I have evidence enough to know that similar conditions exist in other food industries.

Belief that such poor use has been made of the advantages that this industry offers is difficult, especially in those departments where raw materials have been abundant and can be converted into palatable and well-finished products through the use of the right finishing ingredients.

From my experience in the food industry, however, no one from the hourly wage worker to the president of the company appears to be capable of being taught. Each has his own "secrets." Guesswork prevails from the purchasing, preparation and processing of the raw material supplies to the selling of the finished product. With pride each department head keeps apart and remains exclusively attentive to his duties and position.

At a cost of thousands of dollars, wasted largely on individual rivalries and personal jealousies, this working at cross purposes had been permitted to go on. All of this unnecessary expense and wasted energy could have been converted into manufactured products that could be sold on an increased profit basis and to the satisfaction of a discriminating public.

See What I Mean?

A step into the cooked products department of the branch of the food industry that I know best will illustrate the point of discussion. There we find a group of men and women workers under the watchful eye of a foreman. No one but the foreman knows the formulas for the different products that the department makes. Of course, his duties include ordering of the various raw materials and supervising the grinding, mixing, seasoning, curing and the like, incidental to the making of the products.

As well as he may perform these duties, the question arises as to whether or not he prepares all of these products with the skill required to (1) meet the demands of the market in which the products are to be sold; (2) make the products on a large-scale basis as good as on a small-scale basis; and (3) give the product the finish and flavor desired.

The question is best answered by saying that, in the main, this foreman has reached his position of unwarranted authority over products and formulas through seniority, or because he previously had been in charge of a similar department in a company whose products found a receptive and profitable market. Those individuals who understand the fundamental principles of cookery and are capable of working out basic formulas are far too few to be available as mere foremen.

Sad to say, such knowledge and such talent cannot be acquired superficially or from books. Such knowledge requires an understanding of fundamental principles plus an experience of practical application and an ability born with the man. An artist may be developed but he cannot be made by the reading of books.

One prominent meat packer has stated in a public talk that his ideal was to have in his organization a culinarian—a man who knew, and knew how to apply, the fundamental principles of cookery. He also expressed the conviction that a really good commercial cooked product can be made only by an epicure. This packer knew what he was talking about.

There is a good reason why nearly all commercially cooked products of

(*Turn to page 135*)

Editor's Note

Creation of flavor quality is a synthetic art not to be confused with quality control. The creation of flavor calls for something seldom possessed by a food technologist. Of all the people we know, the man most capable of creating new flavor delights is woefully lacking in technical knowledge. But after the standard has been set, the food technologist is the one most capable of producing the desired product with unvarying quality and at low cost. We publish Labouche Cheval's analysis of one source of indifferent flavors in foods to point out this weakness and to suggest that manufacturers, give it consideration in their postwar thinking and preparations. Though it is retrospective in its allusions to the abundance of meat, spices and flavor materials, the ideas set forth are sound for the days of peace when they come again.

A Better Way To Determine The Jelling Power of Pectins

By R. E. COX, Research Department, California Fruit Growers Exchange, Corona, Calif., and R. H. HIGBY, The Exchange Orange Products Co., Ontario, Calif.

Jelly forming ability of pectins varies greatly, and preservers should determine this property accurately. Since existing methods were unsatisfactory, a new instrument has been developed which has many advantages

PECTIN as produced varies greatly in its jelly forming ability, depending upon the fruit from which it is derived and the method of manufacture. Jelling ability is ordinarily expressed as "grade," the number of pounds of sugar one pound of pectin will jell under certain specified conditions. Since pectin is sold on the basis of grade, it is important that this property be determined as accurately as possible. Usually this is done by making jellies from pectin under controlled conditions for comparison by hand with jellies made from a standard pectin sample. Although remarkable proficiency can be attained by those experienced in this method, it is obvious that hand grading allows wide latitude for individual judgment and never can be entirely accurate.

The need for a more reliable method of testing has been recognized by pectin manufacturers generally. The Exchange organization has continued its search since the start of pectin manufacture about 20 years ago. Six testers described in the literature, including the Tarr-Baker and the B. A. R.,* have been investigated, many others have been considered and a number of our own design have been constructed and tried. As a result of this search, an instrument and method of use have been developed which allow grade to be determined with accuracy and precision.

The principle upon which this method depends was first developed by two British workers, Lockwood and Hayes[1]. They measured the percentage sag, or slump, occurring when a test jelly was removed from its supporting container and inverted upon a glass plate. The original method was used in determining the strength of gelatine and agar jellies. The measurement was made with an instrument which these workers called a "Ridgelimeter." It permitted measurements to be made to 0.001 in. over a distance of several inches. Four measurements were required to determine the amount of sag, followed by rather tedious calculations to determine the percentage. Early tests in our laboratories indicated that the principle was sound but that the method was too complicated for routine use.

The present modification of the Ridgelimeter requires only one measurement and entirely eliminates calculation in arriving at the percentage decrease in height of the test jelly. This is accomplished by using jelly glasses of definite depth with a measuring device which gives the percent decrease in height directly. Removable "sideboards" are provided on the glasses to permit overfilling, then after the jellies have set, the excess jelly is sliced off level with the rims of the glasses. This gives a supported jelly of definite known height. When inverted with the container removed, the decrease in height is read as percent of sag by a single setting of a micrometer screw.

* British Association of Research for Cocoa, Sugar, Confectionery and Jam Trades, London.

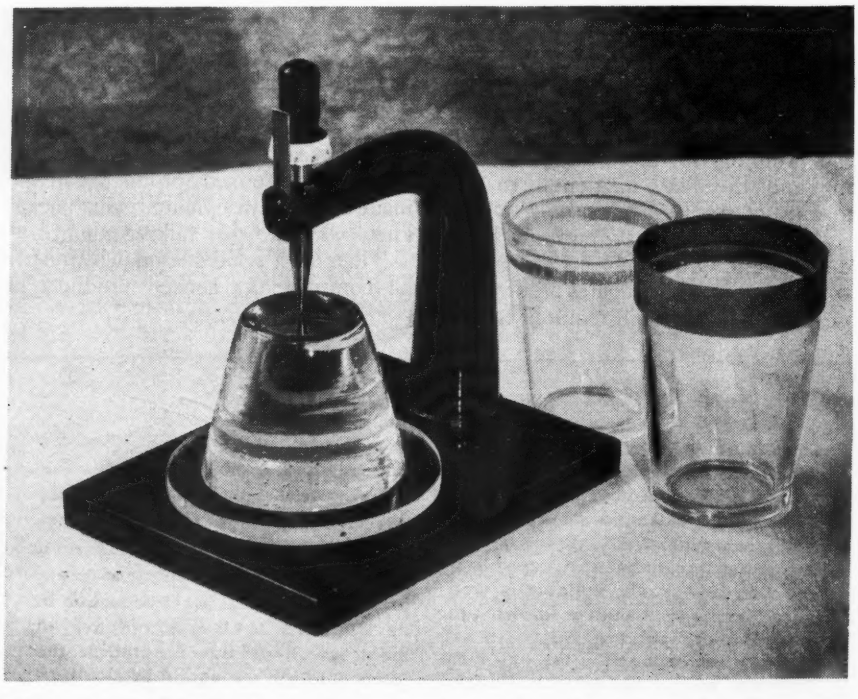


FIG. 1. The new tester, with a jelly in measuring position. Also shown are glasses with and without "sideboards."

Description of the Instrument

Figure 1 shows the tester with a jelly in measuring position and jelly glasses with and without "sideboards." The glasses have a standard depth of 3.125 in. The micrometer screw has 32 threads to the inch; therefore, one revolution moves the point 0.03125 in., or 1 percent, of the supported height of the jelly.

Calibration Curve

In the pectin industry at present, there exists no definition of standard firmness for test jellies. Each manufacturer has his own conception of standard firmness, with competitive necessity as the only harmonizing

factor. On this basis, the data presented here define our own conception of standard firmness and should be considered with this limitation in mind.

To correlate percent of sag with standard firmness, five composite samples were prepared, these representing many lots of five different types of pectin made by the Exchange. All of the components had been standardized as carefully as possible by hand grading. Jellies were prepared at standard grade and at definite percentages above and below grade. Then after the percent of sag was determined on each glass of jelly, it was possible to plot the curve shown in Fig. 2. It is evident that our conception of standard firmness is defined as 23.5 percent of sag, and that by the use of a curve of this type jellies which are as much as 20 percent above or below standard firmness can be graded with accuracy.

The curve of Fig. 2 is a compromise drawn by inspection from the data of five types of pectin. Originally, five curves were prepared, but it was found that one curve was satisfactory within the limits of accuracy of the method.

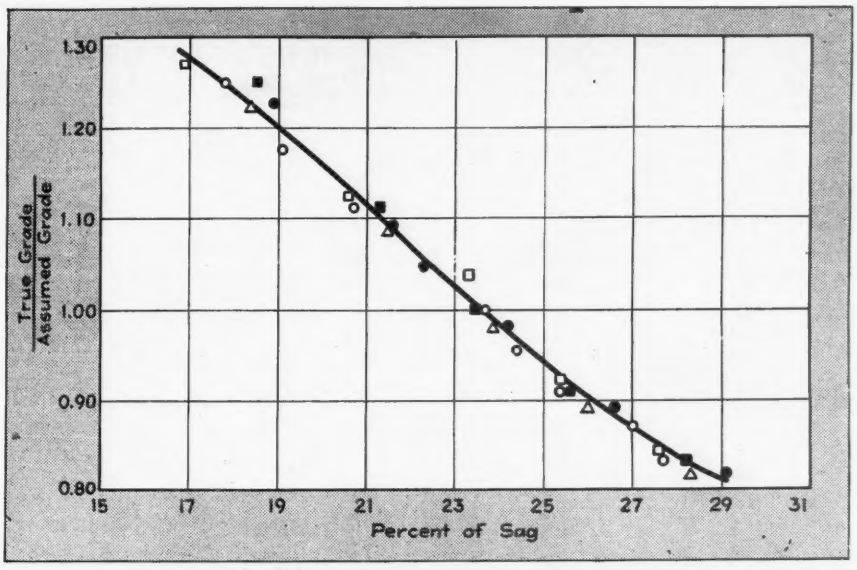


FIG. 2. With a curve of this type, jellies which are as much as 20 percent above or below standard firmness can be graded with accuracy.

The curve was plotted with percent of sag as the abscissa and true grade divided by assumed grade as the ordinate. The use of this curve is shown by the following example.

Suppose that a jelly was made at 200 grade and that it showed 26.0 percent of sag. Fig. 2 indicates that the true grade is 0.9 of the assumed grade or 180.

TABLE I—Effect of Storage Time at 25 deg. C. on Percent of Sag

Glass number	Storage Time 16 Hours (percent)	24 Hours (percent)	40 Hours (percent)
1	23.7	23.4	23.2
2	23.8	23.7	23.2
3	23.9	23.5	23.4
Average	23.8	23.5	23.3

TABLE II—Effect of Storage Temperature on Percent of Sag.

Glass number	Pectin A 20°C. (percent)	30°C. (percent)	Pectin B 20°C. (percent)	30°C. (percent)
1	23.2	23.7	23.1	23.6
2	23.3	23.7	22.8	23.4
3	23.3	23.6	23.4	23.6
4	23.3	23.2	23.5	23.6
Average	23.3	23.6	23.2	23.6

TABLE III—Reproducibility of Results in Repeated Tests on Two Pectins

Assumed grade	Percent of Sag Glass No. 1	Glass No. 2	Average	Indicated grade from curve	Average indicated grade
			Pectin C		
150	22.8	22.8	22.8	155	...
150	23.0	22.9	23.0	153	...
150	22.7	23.0	22.9	154	154
150	22.8	22.6	22.7	155	...
150	23.1	22.7	22.9	154	...
			Pectin D		
150	23.0	22.9	23.0	153	...
150	23.3	23.8	23.6	149	...
150	23.4	23.1	23.3	152	152
150	22.4	23.4	22.9	154	...

TABLE IV—Comparison of Results by Hand and Tester Grading.

Sample number	Hand grade	Percent of Sag Glass No. 1	Glass No. 2	Average	Grade from curve
1	150	22.4	22.5	22.5	157
2	150	22.7	22.5	22.6	156
3	150	22.3	22.1	22.2	159
4	150	22.1	22.5	22.3	158
5	150	22.3	22.2	22.3	158
6	150	23.6	23.8	23.7	149
7	150	23.1	23.2	23.2	152
8	150	22.7	22.7	22.7	155
9	150	22.4	22.6	22.5	157
10	150	24.2	24.2	24.2	146
11	150	22.3	22.4	22.3	158
12	150	23.0	23.0	23.0	153
13	150	23.5	23.5	23.5	150
14	150	22.1	22.4	22.3	159
15	150	23.3	23.6	23.5	150

Preparation of Test Jellies

Jelly batches used in calibrating the tester were made by the following formula and method.

Distilled water.....	450 ml.
*Pectin (150 grade).....	5.20 g.
*Sugar (sucrose).....	775 g.
Cook to.....	1200 g. final weight

* At assumed grades other than 150, an amount of pectin equal to 780 g. divided by assumed grade is used. The weight of sugar is altered to make the total of sugar and pectin equal to 780 g. The final jelly contains 65 percent soluble solids.

The pectin is mixed with about 50 g. of the previously weighed sugar, and the mixture is thoroughly dispersed in the water in a tared jelly pan of about two quarts capacity. Stirring is continued as the dispersion is heated to a full boil, then the remaining sugar is added. Heating and stirring are continued until the liquid again reaches the boiling point. The net weight is checked, and if necessary is adjusted by further boiling or by the addition of distilled water. If it is necessary to add water, this should be added in excess and the weight readjusted by further boiling and stirring. When the net weight is correct, the liquid is skimmed and poured into four previously prepared glasses equipped with "sideboards" and containing 2.0 ml. of tartaric acid solution (488 g. acid per liter of solution). The liquid is stirred during pouring to thoroughly incorporate the acid. With the containers filled to capacity, the net weight of jelly is about 273 g. The filled containers are covered and set aside for 18 to 24 hours.

Use of the Jelly Tester

At the end of the storage period, the paper strips acting as "sideboards" are removed and the exposed jelly is sliced level with the rims of the glasses, using a tightly stretched wire (cheese cutter). The disk of excess jelly is discarded. The jelly is then turned out of the glass in an inverted position on the circular glass plate provided with the instrument. The plate is placed on the base of the tester with the jelly centered under the point of the micrometer. Two minutes after turning out the jelly, the point is made to touch the jelly surface by carefully turning the micrometer head and watching for the first sign of contact. Sag is read to the nearest 0.1 percent. The jelly is either discarded or reserved for judgment of texture. The glass plate should be washed and dried between determinations. Several jellies from the same batch should be tested and the average percent of sag used in computing the grade of the pectin.

Effect of Storage Time

It was thought that the length of time the jellies are allowed to stand before grading might have an im-

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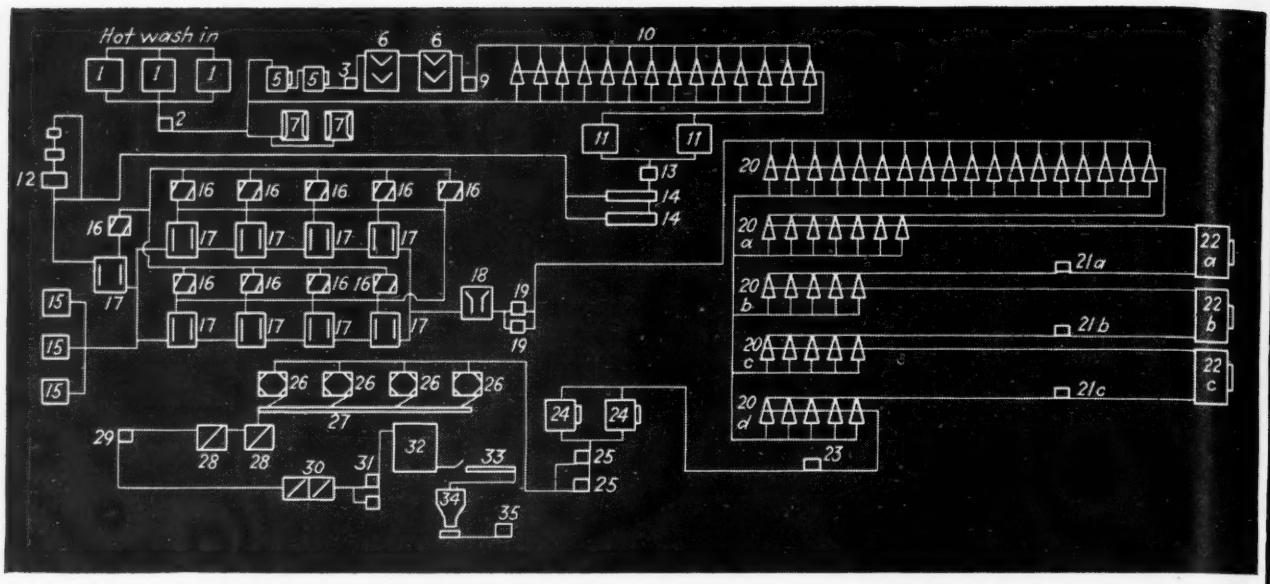

Plan of distillery-wash yeast factory. Production capacity is 2,400 to 3,000 tons a year.

How Sweden Produces Yeast For Nutritional Purposes

By OLLE ROSENQUIST, Swedish Yeast Co., Stockholm

Wartime blockade has forced Sweden to produce yeast to alleviate its protein shortage. This article describes the process, lists power, material and labor requirements and gives some data on costs and on nutritional values

SWEDEN'S import surplus of protein is considerable in peacetime. The blockade induced by the war has, however, made it necessary for the country to try to replace its former imports by producing protein on its own account. The deficiency in resources is most noticeable as regards animal protein, so that it is not possible to make good the shortage solely by agricultural methods, which primarily supply vegetable protein.

Yeast protein resembles meat protein much more than it does vegetable protein. Moreover, on account of its high protein concentration, yeast can be used to alleviate the shortage in those places where this is most acute.

Yeast is obtained as a byproduct of the manufacture of sulphite alcohol, as so-called "alcoholic yeast." And it may be produced in large quantities in a special plant designed for the production of torula yeast. The latter is rather expensive and is intended for human consumption. The first-mentioned type is cheaper but is of inferior quality and is utilized as fodder.

The production of torula yeast requires both nutritive salts in the form of nitrogen and phosphorus, and also sugar. The only cheap form of sugar available in Sweden is the pentose contained in the sulphite wash liquor remaining behind after the hexose sugar has been fermented into alcohol and this alcohol has been distilled off.

Alcohol Yeast Production

In an efficiently run sulphite spirit distillery, it is possible to obtain, as a byproduct and without the adoption of any special measure, about 35 metric tons of dry yeast per million liters of alcohol produced (about 1⅓ tons per 1,000 U. S. gallons). By the installation of a special aerating device and increased admixture of nutritive salts, this yield can be doubled. Strangely enough, no drop in the alcohol yield occurs in that case. This is due, presumably, to the fact that the powerful development of cells gives a higher efficiency in the alcohol fermentation process itself. The yeast yield can be raised further, but in that case the alcohol yield will drop at the rate of about 1.3 liters of absolute alcohol per kilogram of dry yeast.

Special neutralization, together with careful clarification, renders this byproduct yeast lighter in color, making it, in certain cases, suitable for human consumption. All the sulphite distilleries in Sweden, which have an annual capacity of 80 million liters of alcohol, could produce approximately 2,500 tons of dry yeast if fully developed.

Torula Production

A method for the production of torula yeast from distillery wash has been worked out. At present, a plant operating on a semi-plant scale at Svartvik is producing 350 tons of yeast annually. This plant is owned by the Swedish Yeast Manufacturing Co. and the Swedish Cellulose Co. Another factory is being constructed by Fiskeby Manufacturing Co., at Skärblacka, under license from the yeast company. Both factories have

been designed with a view to supplying the practical experience required if further increased yeast production becomes necessary.

The fundamental working scheme for a plant of this sort is shown in the diagram. This illustrates the plan of a distillery-wash yeast factory, the sugar content of the wash being estimated at 9 kg. per cubic meter and the annual production amounting to 2,400–3,000 tons of dry yeast.

In this diagram (1) represents a storage tank for hot wash coming from the distillation column. A pump (2) conveys this wash to two continuous precipitation chambers (5). In these chambers, the wash is subjected to chemical treatment—for example, precipitation with sulphuric acid which is supplied from the storage containers (7). The chambers (5) are fitted either with circulation pumps or stirrers, and the treated wash is subsequently fed by pump (3) into two continuous clarifying tanks (8), from which the clarified liquid is conveyed by the pump (9) to a battery of centrifugal separators (10). These separators remove the sludge which could not be taken out in the clarifying tanks (6).

The sludge-free wash is then collected in the storage tanks (11), from which it is continually fed to the coolers (14), which operate alternately and are cleaned periodically. The cooled wash then passes into the fermenting-vat system (17), going first to the preliminary fermentation vat and passing from there continuously through the fermentation process assembly. The fermented wash is then accumulated in a collecting and froth vat (18), possibly provided with devices for mechanical froth reduction. Fans (16) are connected to the fermentation vat for air-supply purposes, while the nutritive salts which are contained in a dissolved state in the chemical tanks (15) are supplied continuously to the system via a dosing device. The function of the device (12) is the propagation of pure new yeast cultures which are supplied to the preliminary fermentation vat in which the yeast fermentation process is started. The process also might be arranged so that new pitching yeast is continuously supplied from that system. Pumps (19) move the deaerated fermented liquor from the storage vat (18) to the separator section (20).

In the first stage of this separating section, the liquor is divided into yeast-containing and yeast-free parts. To minimize the number of separators in the washing stage, the portion containing yeast is passed through a concentration stage (20a). In this stage the liquor is again divided into two fractions, whereby the concentration in the portion containing yeast is increased. This concentrate is then conducted to the first of the washing tanks (22a), these being provided with stirring apparatus or a circulating pump, where washing water is added to it. A new separation is effected in the first washing stage (20b), after which the yeast concentrate is again diluted down in the second washing tank (22b), then conveyed into the second washing stage (20b). The whole procedure is repeated in the third washing stage (20d), from which a yeast concentrate is finally obtained. This is fed by the pump (23) into concentrate tanks (24) provided with stirring devices.

The yeast concentrate in these tanks contains about 10 percent of solid yeast and is fluid. This fluid concentrate is then supplied by pump (25) to a number of rotating filters (26), where the yeast is separated out from the water and drops down on to a conveyor (27). The solids content of the yeast mass is then about 20 percent, and its consistency corresponds to that of baker's yeast. It is then fed by the conveyor to two autolyzers (28) equipped with stirring and heating devices. The solid yeast is then separated by flotation and can be discharged by pump (29) into a preliminary two-stage evaporator (30). Here the solids content is raised from about 20 to 35 percent. The comparatively viscous mass is then conveyed from the preliminary evaporator by pumps (31) to a spray drying device (32), in which it is dried by hot air to a finely divided powder. This powder is conducted by conveyor (33) to a bin (34), from which it can be weighed out on the sack scales (35).

In the cultivation of torula yeast, a yield of 40 percent is generally obtained in practice, although substantially higher figures are ascertainable in the fermentation vats. The yield is established on the basis of yeast with an 8 percent water content per kilogram of sugar contained, determined according to the Schoorl method.

A prerequisite for cultivation is that aeration shall be effected in the emulsoid state. In that event, the fermentation period will be short, 3 to 7 hours. The homogeneous and, practically speaking, stable emulsion contained in the fermentation vat will then comprise about 35 percent air, the remainder being liquid.

The data on power, material and labor are given in Table I, these applying to a plant with an annual output of 1,000 tons.

TABLE I—Power, Material and Labor Requirements.

	Per ton of dry yeast
Electric power	4,000 kw.-hr.
Steam	11 tons
Water	1,000 c.m.
Sulphuric acid	0.2 tons
Ammonium sulphate	0.6 tons
Superphosphate, 20 percent	0.3 tons
Magnesium sulphate, 7 H_2O	0.05 tons
Potassium chloride	0.06 tons
Workmen	26 men for 1,000 tons per annum
Plant superintendents and laboratory staff	5 men

TABLE II—Amino acid Content of Yeast and Meat.

Amino acids	Content of amino acid in dry yeast	Content of amino acid in raw meat
Vitally important		
Cystine	0.88	traces
Phenylalanine	2.56	0.71
Histidine	0.4	1.30
Lysine	1.52	1.45
Methionine	0.65	....
Threonine	4.2	....
Tryptophane	1.31	traces
Thought to be vitally important		
Tyrosine	1.61	0.43
Valine	5.06	traces
Leucine	....	2.24
Proline, oxyproline	4.16	0.95
Arginine	1.4	1.30
Not vitally important		
Alanine	6.64	0.45
Glycocol	....	0.14
Aspartic acid	1.27	0.64
Glutaminic acid (oxy)	8.62	3.30

TABLE III—Comparison of Yeast and Meat Prices in Sweden.

Meat price Crowns per kilo	Yeast price Crowns per kilo
0.50	1.16
0.75	1.73
1.00	2.31
1.25	2.88
1.50	3.46
1.75	4.04
2.00	4.62
2.25	5.20

The composition of the dried torula yeast is about 48 percent protein, 2 percent fats, 34 percent carbohydrates, 8 percent salts (principally phosphates and potassium salts) and 8 percent water. Of the nutritious substances contained in the yeast, the human body is capable of utilizing 90 percent. The caloric value of the product is about 4,200 kilo calories per kilogram.

The protein of the yeast has a composition of amino acids closely resembling that of meat, which explains why an aroma like that of fried meat is given off when dry yeast is baked. Table II indicates the amino acid content of yeast and meat.

By way of comparison, it may be stated that raw medium-fat beef is composed of 21 percent albuminoid substances, 1 percent salts and 73 percent moisture. The caloric value is 1,700 kilo calories per kilogram. Its digestibility is in excess of 90 percent.

Owing to the low moisture content of the yeast compared with that of meat, the yeast is a particularly con-

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Food Fish Dehydrate Well

Palatable dishes can be prepared from food fish dehydrated under controlled conditions. Precooking reduces time of drying and rehydration. Vacuum packing and cool storage required

By W. S. HAMM, C. BUTLER and M. HEERDT, JR.,
Seattle Fishery Technological Laboratory*.

BECAUSE dehydrated fish have the same advantages in shipping space and ease of transport that other dehydrated products enjoy, the Seattle Technological Laboratory, U. S. Fish and Wildlife Service, has undertaken research on dehydration procedures for Pacific Coast food fish.

Experiments were undertaken on a few species to determine the effect of drying temperatures and humidities on the quality of the dehydrated product. Then, utilizing the optimum conditions found, several other species were examined to determine their suitability for dehydration. These dehydrated samples were then packed in various types of containers, under different gases, and held at different storage temperatures to find the conditions that would give a long storage life. The factors of preparation, precooking, and compression of the final product were also studied.

Experimental Dehydrater

The work on dehydration first involved the construction of an experimental dehydrater in which all the dehydration experiments were carried out. In this the drying conditions that would prevail in a commercial dehydrater can be duplicated.

The dryer shown in Fig. 1 consists essentially of two air ducts or tunnels measuring 18 by 23 in. by 18 ft. The upper tunnel is the drying chamber, the lower serves as an air duct for recirculated air and makeup air. The lower tunnel contains the steam heating units and the automatic temperature and humidity controls. Temperatures may be regulated over the range 110 to 220 deg. F., and relative humidities, up to 60 percent.

Air is heated by two steam heat exchanger units located centrally in the lower tunnel. The air is supplied by a motor-driven pressure-type fan mounted in such a manner that it connects the discharge end of the drying tunnel and the intake end of the lower tunnel. Adjustment of vents and baffles in the upper tunnel controls the air stream so that any condition from total recirculation to total exhaust may be obtained. Air velocities from zero to 900 ft. per minute can be obtained. In practice, the air velocity used was 850 ft. per minute.

The upper tunnel accommodates four trucks, each of which holds seven drying trays. These trays consist of wooden frames 2½ sq. ft. in area, covered with ⅛-in.-mesh galvanized hardware cloth.

Preparation of the Fish

Fish that are to be dehydrated must be in prime condition, for such things as rancidity and putrefaction odors are intensified rather than removed by the dehydration procedure.

The fish can be butchered in a variety of ways for dehydration, but in the majority of the experiments described in this report fillets were used.

It was noted in preliminary experiments that fish required precooking for speedy dehydration and good reconstitution. Therefore, an experiment was carried out to establish, if possible, an optimum cooking time. Using rockfish, a series of runs was made in which raw fillets and fillets cooked at 212 deg. F. for periods of 2, 5, 10, 20, 30 and 40 minutes were dehydrated at 145 deg. F. and 15 percent relative humidity. As shown in Fig. 2, the raw fish required 135 minutes to dry and rehydrated to 140 percent (based on weight of dehydrated product) whereas the fish cooked 15 minutes required 45 minutes to dry and rehydrated to 310 percent.

Raw and insufficiently cooked fish require too long for drying and give an inferior product with respect to rehydration qualities. At the other extreme, prolonged precooking adds nothing to the drying characteristics and there are indications that it may detract from the rehydration quality.

Herring and pilchard cooked for 45 to 60 minutes at 240 deg. F. did not rehydrate to as great an extent as those cooked for a short time at a lower temperature, but the saving of labor in removing the bones may be

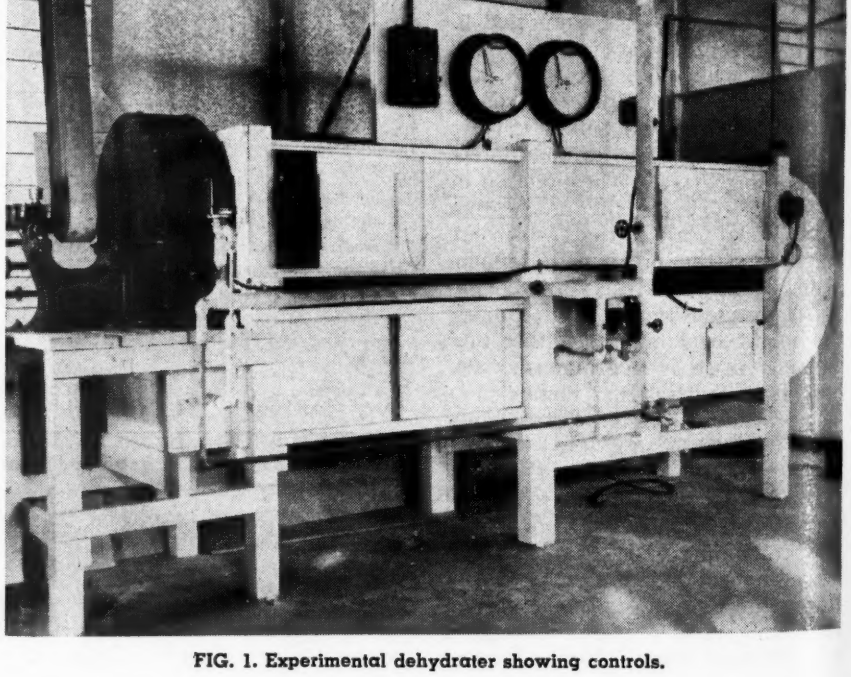

FIG. 1. Experimental dehydrater showing controls.

* Division of Fishery Industries, Fish and Wildlife Service.

of great enough importance to overcome this more or less minor disadvantage. The procedure adopted was as follows:

Fillets were placed on perforated metal trays, stacked in a vertical retort, and cooked 7 to 10 minutes at 5 to 10 lb. steam pressure. The cooked fish were then minced in a meat chopper, and loaded at the rate of 1 lb. per square foot of tray. Cooling prior to mincing is necessary for very fat fish. The trays were placed in the dryer, which had been previously adjusted to the selected drying conditions, and dehydrated.

In some cases dressed fish were cooked only long enough to coagulate the tissue and, after cooling, the bones were picked from the flesh. Some of the smaller species were cooked at a steam pressure of 10 lb. for 45 to 60 minutes. This softened the bones so that they then could be dehydrated along with the flesh. With very fat fish it was found advantageous to press the cooked flesh for oil and water removal prior to dehydration.

Many Species Found Suitable

Many factors influence the utility of any particular species for dehydration purposes. Availability at a low price would obviously be of major importance from a commercial standpoint, but the manner in which a species dehydrates, and its keeping qualities on storage, are no less important.

Table I reports the results of drying experiments on the different species. Loss on cooking comprises the loss of water and of water-soluble proteins from the fish itself. The percent yield is the yield in pounds per 100 lb. of edible raw fish. Species that show the highest yield are primarily those with high initial fat and protein contents. Proximate analyses were made on the dehydrated product.

The rate of drying is the average from runs made at 145 deg. F., 10 percent relative humidity, at 1 lb. per square foot tray loading, and represents pounds of water removed per square foot of tray per hour.

All of the species listed in Table I are easily dehydrated and yield a product which for a limited time is nearly as palatable as the fresh fish.

Effect of Drying Temperature on Quality

Preliminary tests with salmon and rockfish indicated that fish could be injured at temperatures of 190 deg. F. when almost dry. Experiments were made with rockfish with initial drying temperatures from 145 to 205 deg. F. at 15-deg. intervals and at 10, 20 and 40 percent relative humidity levels at each temperature. The higher temperatures, 175 deg. F. and upwards, were applied only during the initial drying period, the temperature being lowered to 145 deg. F. when the product approached dryness. In this range there was no particular temperature which gave a product of superior palatability.

A similar experiment on herring over the temperature range 145 to 175 deg. F. again indicated that the higher temperatures did not yield an inferior product.

Over the humidity range tested there was no apparent quality difference attributable to this variable, but the drying time was increased considerably at the higher humidities.

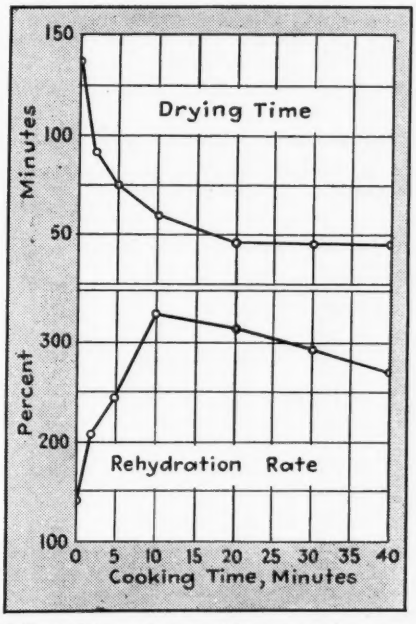

FIG. 2. Effect of precooking on drying time and percent rehydration.

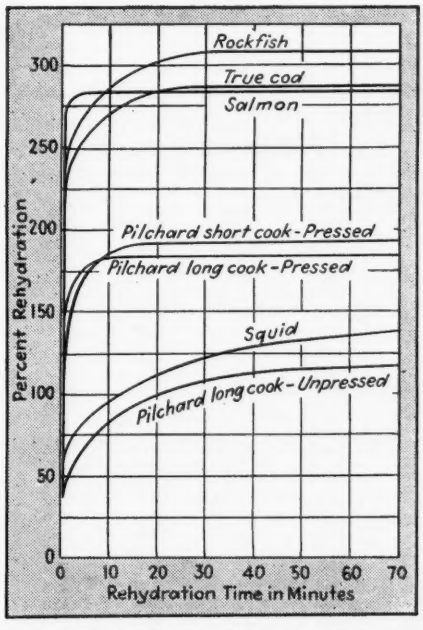

FIG. 3. Rate and extent of rehydration for various species of fish.

Effect of Moisture and Temperature on Keeping Quality

High moisture samples stored at 100 deg. F. were rendered unfit for use within two weeks. Surprisingly enough, certain fat fish, salmon, herring and pilchard, packed in hermetically sealed containers, seemed to keep better at high temperatures than the lean fish, and also had a greater tolerance with respect to moisture content.

In order to check these preliminary observations, sample of rockfish and white king salmon containing 2, 5, 10 and 20 percent moisture were packed in hermetically sealed tin containers under vacuum and under nitrogen, and also in air in heavily waxed fiber containers. Samples were then stored at 70 deg. and 100 deg. F.

The samples were examined organoleptically after 2 weeks, 11 weeks and 17 weeks. A progressive change in the color was noted, usually from what could be termed the "bright normal" to a yellow-orange, which is similar to the color change known as "rusting" in frozen fish. The odor and taste characteristics varied from normal through stale, sour, overheated, scorched and rancid. The fish in hermetically sealed containers did not become rancid.

Texture was another factor which underwent a great change under storage conditions, and there were variations from normal tenderness through different degrees of toughness to a rubber-like material. The percent rehydration also decreased as storage was continued.

Tables II and III summarize the changes in quality that occur on storage at different temperatures as affected by moisture content, containers and atmosphere. In the selection of the adjective terms used to describe the quality the factors of color, odor, taste, texture and rehydration were considered. The terms used are "very good," "good," "fair," "poor" and "inedible."

The keeping qualities of the rockfish samples, Table II, indicate that there is no choice between nitrogen and vacuum pack. Heavily waxed fiber containers were generally unsatisfactory even at the lower storage temperature. Tin containers are the only ones which proved satisfactory if the fish were to be stored for any length of time, even at 70 deg. F.

There were significant differences between the different moisture levels.

At both temperatures the 2 percent moisture sample was the only one rated good after 17 weeks. The 5 percent sample after the same length of time was only fair, and the 10 and 20 percent samples were inedible in all containers after 100 deg. F. storage. The 20 percent sample was also inedible when stored at 70 deg. F. after 11 weeks.

The keeping qualities of the salmon samples are compiled in Table III. The data on the containers and atmospheres agreed with those of the rockfish. However, in the hermetically sealed containers salmon kept better than rockfish, and even the 5 percent moisture sample was still good after 17 weeks at 100 deg. F. In fiber containers, salmon samples stored at 100 deg. F. had become inedible at all moisture levels after 17 weeks.

Additional samples of various representative species were packed in hermetically sealed containers under vacuum, nitrogen, carbon dioxide and air. The samples after storage were examined as to color and odor in the dry state, and by taste, texture and percent rehydration in the reconstituted material. There was no choice between the vacuum and nitrogen samples. However, the carbon dioxide and air-packed samples were somewhat inferior to the nitrogen and vacuum packed samples.

TABLE I—Drying Data and Product Analysis by Species.

Species	Loss on Cooking,[1] percent	Yield,[2] percent	Fat, percent	Ash, percent	Protein (Nx6.25), percent	Moisture, percent	Average Rate of Drying[3]
Rock cod	20.3	20.5	10.5	3.5	84.9	5.0	0.72
True cod	24.8	14.6	1.5	5.0	91.0	4.3	0.76
Halibut	10.8	26.0	5.0	4.6	88.9	3.9	0.70
Herring	31.6	17.4	7.9	12.1	76.0	6.0	0.72
Pilchard[4]	22.8	28.2	27.5	6.2	66.1	3.2	0.73
Pilchard[5]	23.5	32.4	37.7	6.0	53.1	6.1	0.53
Rockfish	24.5	18.5	3.8	4.1	87.5	5.0	0.88
Chum salmon	17.6	32.8	15.0	4.0	80.1	3.1	0.69
King salmon	12.9	28.4	21.9	4.5	72.5	4.1	0.62
Pink salmon	20.0	25.0	19.9	4.2	74.5	3.9	0.65
Silver salmon	7.2	35.0	14.4	4.6	78.2	4.4	0.55
Petrale sole	25.0	20.8	17.5	3.5	69.7	10.5	0.52

[1] Pounds lost in precook process per 100 lb. of dressed or filleted fish.
[2] Pounds dry product per 100 lb. of dressed or filleted fish.
[3] Loss of moisture per square foot of tray area per hour.
[4] Pilchard pressed prior to dehydration.
[5] Same lot of fish as [4], not pressed prior to dehydration.

TABLE II—Effect of Storage Temperature and of Moisture Content on the Keeping Quality of Rockfish.

Container	Moisture as packed, percent	Quality rating after storage: 2 weeks	11 weeks	17 weeks	Percent rehydration* after storage: Original	2 weeks	11 weeks	17 weeks
		70 deg. F. storage temperature						
Tin—vacuum pack	2	Very good	Good	Good	280	280	285	265
	5	Very good	Good	Fair	320	280	285	265
	10	Fair	Poor	Poor	320	235	250	215
	20	Poor	Inedible	Inedible	210	150	150	140
Tin—nitrogen pack	2	Very good	Good	Fair	280	290	270	265
	5	Very good	Good	Fair	320	250	255	245
	10	Fair	Poor	Poor	320	240	250	215
	20	Poor	Poor	Inedible	210	150	155	140
Fiber—air pack	2	Good	Fair	Poor	280	265	265	255
	5	Fair	Fair	Poor	320	250	260	225
	10	Poor	Poor	.....	320	230	225	...
	20	Poor	Inedible	Inedible	210	125	150	190
		100 deg. F. storage temperature						
Tin—vacuum pack	2	Good	Good	.....	280	275	250	...
	5	Good	Fair	Fair	320	255	265	225
	10	Poor	Poor	Inedible	320	220	215	195
	20	Poor	Inedible	Inedible	210	130	125	120
Tin—nitrogen pack	2	Good	Good	Good	280	290	275	250
	5	Fair	Fair	Poor	320	240	235	225
	10	Poor	Poor	Inedible	320	215	205	195
	20	Poor	Poor	Inedible	210	125	135	130
Fiber—air pack	2	Fair	Poor	Poor	280	265	265	240
	5	Fair	Poor	Poor	320	245	235	215
	10	Poor	Inedible	Inedible	320	195	200	200
	20	Inedible	Inedible	Inedible	210	115	150	140

* Based on weight of dehydrated product.

TABLE III—Effect of Storage Temperature and of Moisture Content on the Keeping Quality of King Salmon.

Container	Moisture as packed, percent	Quality rating after storage: 2 weeks	11 weeks	17 weeks	Percent rehydration* after storage: Original	2 weeks	11 weeks	17 weeks
		70 deg. F. storage temperature						
Tin—vacuum pack	2	Very good	Very good	Very good	395	340	300	250
	5	Very good	Good	Good	215	225	240	210
	10	Very good	Fair	Poor	200	200	195	190
	20	Good	Fair	Poor	175	130	130	150
Tin—nitrogen pack	2	Very good	Very good	Very good	395	330	285	255
	5	Good	Good	Good	215	220	225	220
	10	Very good	Good	Fair	200	190	185	180
	20	Good	Fair	Poor	175	120	120	125
Fiber—air pack	2	Very good	Good	Poor	395	280	275	240
	5	.....	Good	Fair	215	...	225	200
	10	Fair	Fair	Poor	200	180	205	170
	20	Poor	Inedible	Inedible	175	120	135	170
		100 deg. F. storage temperature						
Tin—vacuum pack	2	Very good	Very good	Good	395	330	270	255
	5	Good	Good	Good	215	215	205	185
	10	Good	Fair	Poor	200	190	175	170
	20	Fair	Poor	Inedible	175	110	125	100
Tin—nitrogen pack	2	Very good	Very good	Very good	395	320	255	250
	5	Good	Good	Fair	215	210	210	185
	10	Good	Fair	Poor	200	180	180	165
	20	Fair	Poor	Inedible	175	110	120	105
Fiber—air pack	2	Very good	Fair	Inedible	395	260	250	225
	5	Fair	Poor	Inedible	215	210	195	175
	10	Fair	Poor	Inedible	200	170	180	165
	20	Inedible	Inedible	Inedible	175	110	130	125

* Based on weight of dehydrated product.

Compression

In compression tests the leaner species did not form a cake at 5,000 lb. per square inch and were reduced to powder by the compression process. Pilchard has been under investigation as the most satisfactory species from the standpoint of the character of the pressed cake. Storage tests on such cakes dipped in paraffine wax are now in progress, but have not proceeded far enough to yield reliable information as to the merit of this packaging method.

Rehydration

Rehydration of the dehydrated fish required little effort. The addition of 4 to 6 parts by weight of cold tap water to 1 part of the dehydrated product, plus an interval of time (15 to 30 minutes), was usually sufficient to bring about maximum rehydration. For uniformity of laboratory practice a sample consisting of 10 gm. of the dehydrated fish was weighed into a small beaker, 60 ml. of tap water at 68 deg. F. was added, and after a given period of time (usually 30 minutes) the drained weight was obtained. Procedure for determining drained weight was based on Food Distribution Administration methods for grading processed vegetables. For rehydrated fish, the drained weight was determined at approximately 68 deg. F. by pouring the fish over a tared circular sieve 8 in. in diameter containing 8 meshes to the inch

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TABLE IV—Drying Ratio and Rehydration Ratio.

	Drying ratio	Rehydration ratio
Pilchard	2.2:1	1:2.0
Rockfish	3.3:1	1:4.1
Salmon	2.9:1	1:3.8
Squid	3.2:1	1:2.2
True cod	5.3:1	1:3.8

When a liquid burns in a container, aim at the wall of the container just above the level of the liquid.

Fire gases are poisonous. Stand where smoke will be carried away from you, not toward you.

Aim the extinguisher stream at what is burning, not at smoke and flames.

As soon as you are sure the fire is out, clear the air of all smoke.

First-Aid Fire Fighting

PART III—How to apply fire extinguisher streams is outlined in this article which concludes the series

MOST incipient fires can be put out in a fraction of a minute, if the extinguisher operator knows how to use his equipment to best advantage.

In fighting a fire in ordinary combustibles such as wood, paper, textiles and the like, the extinguisher stream should be aimed at the base of what is burning, and not at the smoke and flames. Application should be continued until the fire is completely out. Then the operator should search the remains for glowing embers and drench thoroughly any that he finds.

Flammable liquid fires generally fall into two categories—those in containers of liquids and those in spills. If a foam, vaporizing-liquid or loaded-stream extinguisher is used, the operator should play the extinguisher stream against the far inside wall of the container just above the burning surface. This will avoid splashing and permit a natural spread of the extinguishant back over the burning surface. Where possible, the operator should walk around the container while directing the stream, so as to get maximum coverage during the discharge period. Where an operator using a foam or loaded-stream extinguisher must remain at a considerable distance from a container of burning liquid, the extinguishant, directed at a high angle, may be allowed to fall lightly on the burning surface. In no case, however, should the stream be directed into the burning liquid.

If a carbon dioxide extinguisher is used, best results can be obtained by directing the discharge as close to the burning surface as possible, starting nearest the operator and progressing forward, moving the discharge horn slowly from side to side. The discharge should be continued even after the flames have been extinguished, to cool the liquid and prevent a possible reflash.

In fighting fires in spills, the operator should put out the flames nearest him first, and slowly sweep out the fire as he advances along its path.

Fires in electrical equipment should be fought the same way as those in ordinary combustible materials. If vaporizing-liquid or carbon dioxide extinguishers are used the operator can advance as close to the fire as necessary before the current is turned off, though the best practice is always to turn off the current first. If water or water solution extinguishers are used (though they are not recommended for fires in electrical equipment), the equipment must be electrically dead before application begins; otherwise damaging short circuits can result. And if the voltage is high, a harmful charge may travel up the hose stream to the operator.

A few general safety rules should be kept in mind. The operator should stand as far from the fire as conditions and effective use of the extinguishing agent will allow. In the case of a 2½-gal. soda-acid extinguisher, the effective horizontal discharge length is from 30 to 40 ft.; in that of a 15-lb. carbon dioxide type, about 6 ft. The operator should maintain his position between the fire and an exit to permit ready escape. If the fire is outdoors or in the path of a strong draft, he should stand to windward (his back to the wind). As soon as the fire is out, the area should be ventilated.

The operator pictured here is employing the proper technic in aiming the stream at the base of the fire rather than at the surrounding flame and smoke.

Truck Maintenance System That Works

Four printed forms, a fuel dispenser and a shop clerk are all that are needed to make this preventive maintenance system tick, with no increase in costs. Success depends on accurate speedometers and mileage records

MUCH has been written about the need for preventive maintenance to keep food field automotive fleets in operation for the duration. Even the ODT, with the help of the Society of Automotive Engineers, has distributed a report on preventive maintenance and inspection procedures. ODT's system and others similar to it are based on the "stitch in time saves nine" theory. These systems list the parts or assemblies which should be inspected, overhauled or rebuilt at specified intervals, according to the size and type of truck and the kind of maintenance work to be done.

Truck Wear Dependent on Miles Run

Since truck wear is more dependent on the mileage run than on any other easily determined factor, the intervals between inspections usually are gaged on this basis. For example, one maintenance system calls for servicing trucks after every 1,000 miles of operation; another after every 5,000 miles; and still others after every 10,000, 20,000 or even 60,000 miles of operation.

If maintenance operations are to be performed after a particular mileage interval, such as after every 1,000 miles, some means must be provided to determine the distance run after each servicing. The actual mileage must be recorded to decide when servicing should be repeated.

Mileage records might easily be kept merely by looking at the truck's recording speedometer and jotting down the mileage reading on a slip of paper or card after the first 1,000 miles. When the speedometer registers the next 1,000 miles, record the reading again.

It is not, however, as simple as this. In order to take speedometer readings, trucks must be equipped with speedometers kept in good operating condition. Surprisingly, many owners of large, well-regulated fleets do not keep a record of speedometer readings. They claim these records cost too much to obtain and result in unnecessary paper work. One fleet owner says that it costs more to keep speedometers in repair than the mileage records are worth, and that sufficiently accurate records can be obtained by other methods at less expense.

Some fleet operators use easier methods. For example, to find the average mileage of a retail milk delivery route, a truck normally assigned to the route is clocked, once, by a trailing truck whose speedometer has been tested and found in good condition. The mileage recorded is the average for the route. To determine the number of miles the test truck travels over any given period, the average mileage is multiplied by the number of days it operates. In over-the-road work, the mileage run between terminals or branches may be taken as set mileages and the tractor or truck mileage calculated by multiplying by the number of trips made.

The fallacies of these easy methods lie in the fact that often the regularly assigned truck is transferred to another route because of accidents, repairs or business emergencies. The true vehicle mileage then becomes mere guesswork.

One retail milk dealer who did not believe in keeping daily truck mileages tried it for a month and discovered that more than 50 percent of his drivers were straying from their retail routes to go home for breakfast every morning. This increased his total truck mileage by more than one-third. Then there was the case of the overland ice cream tractor and trailer driver who was operating between two terminals. He was found 75 miles off his route when he had an accident.

Mileage Records a Must

When an efficient preventive maintenance program is based on the mileage run, vehicles should be equipped with recording speedometers and a method devised to keep a record of the number of miles covered each day.

There are at least three interval periods in the maintenance of a truck. In the system outlined here we have designated 1,000, 5,000 and 30,000 miles. A method of determining when each truck in the fleet has covered these mileage intervals is, of course, necessary. Even when each unit's mileage interval has been determined, there is still the problem of seeing that the maintenance work called for is done. Unless records are kept when the work is performed, the entire maintenance system is of no value. The fleet owner might just as well call the whole thing off.

Because trucks cannot run without fuel and because mechanical means have not been devised to automatically refuel and oil and water a truck, a fuel dispenser must be employed to do this work. By using this employee to record speedometer readings at the same time the trucks are refueled, the mileage record can be kept without hiring additional help.

System Uses Printed Forms

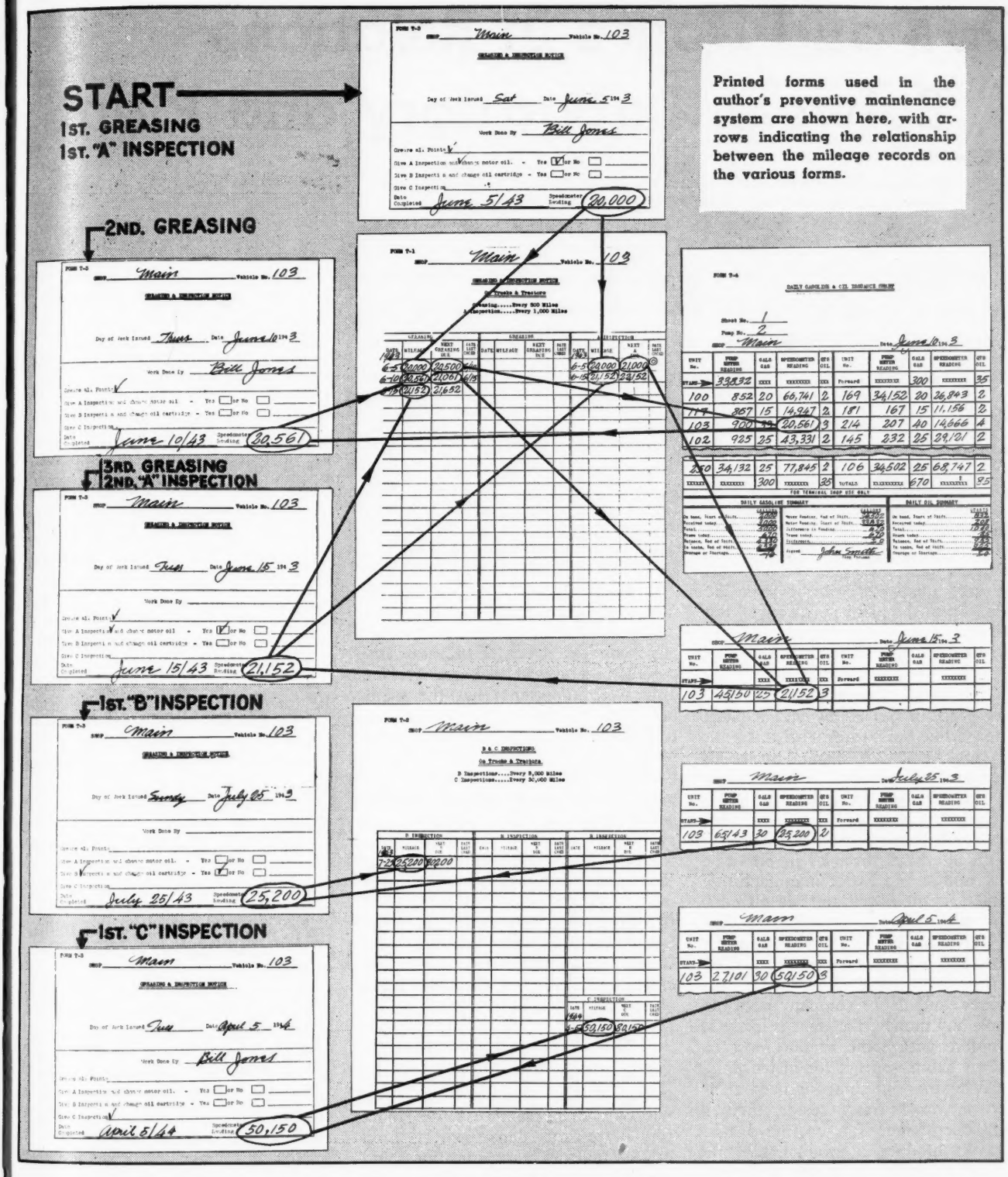
The preventive maintenance system devised by the writer requires three printed forms, in addition to the daily fuel dispersal sheet. This sheet, while essential in keeping an efficient gasoline inventory, is the key to the maintenance program. (How the daily gasoline and oil issuance sheet operates was described in the May issue of FOOD INDUSTRIES.)

Trucks are greased after every 500 miles and are given an "A" inspection after every 1,000 miles, a "B" inspection after every 5,000 miles and a "C" inspection after every 30,000 miles. The three sheets also include Form T-1 for greasings and "A" inspections, Form T-2 for "B" and "C" inspections and Form T-3, a greasing and inspection notice. The latter form is for the mechanic who does the overhauling.

T-1 and T-2 sheets, headed at the top with the truck number, are made out for each unit in the fleet. These forms are put in numerical order in two separate loose-leaf binders entitled, "Greasing and A Inspections" and "B and C Inspections." Each "A" inspection includes a greasing, so that there are two greasings to every one "A" inspection. Forty-two greasings and 21 "A" inspections can be recorded on Form T-1.

Procedure in Operation

For each truck to be greased, the clerk in the shop makes out Form T-3, which is headed by the number of the truck to be serviced. He dates the form and checks to see if the truck is to be given an "A" inspection and


START
1ST. GREASING
1ST. "A" INSPECTION
2ND. GREASING
3RD. GREASING
2ND. "A" INSPECTION
1ST. "B" INSPECTION
1ST. "C" INSPECTION
Printed forms used in the author's preventive maintenance system are shown here, with arrows indicating the relationship between the mileage records on the various forms.

greasing and a motor-oil change. The form is then given to the mechanic who does the overhauling. After he finishes his work, the mechanic signs his name, fills in the date the work was completed and marks down the speedometer reading in the lower right-hand corner of the form.

The filled-in notice is returned to the clerk in the shop office or stockroom, who records the mileage and date when the truck was serviced on Form T-1. For example, if the work is done at a mileage reading of 20,000, the clerk marks down the date and the mileage under the column headed "Greasing Mileage." In the next column headed "Next Greasing Due," he jots down 20,500. (See accompanying illustration.)

Then the clerk again marks down the date and the figure 20,000, but this time in the column on the right marked "A Inspection, Mileage." In the column headed "Next 'A' Due," he records the number 21,000. This completes the starting records for any further greasings and "A" inspections to be made on the truck.

To determine when the next greasing is to be done, the clerk daily compares the speedometer readings on the daily gasoline issuance sheet, Form T-4, with the readings on Form T-1, which show when the truck is to be greased again—in this instance, the figure is 20,500.

In the case illustrated, the clerk

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Do's and Dont's in Relations Between Laboratory and Plant*

By T. M. RECTOR, Vice-president in Charge of Research and Development, General Foods Corp., New York, N. Y.

The food plant laboratory must put its findings to work in the factory. To do this the research men must have the confidence and cooperation of the men in the plant. Here are some pointers from a man who knows how its done

LET'S start out by taking a negative viewpoint on our subject. "Why should the laboratory have any relations whatever with the plant?" It is well known that laboratory men and plant men never understand each other. Plant people, from the laboratory viewpoint, are not very smart and are very unappreciative of scientific help. From the plant man's angle, the scientist is always an impractical and theoretical fellow who is never very useful.

Once, while having an otherwise very peaceful discussion with a plant manager, he burst forth with this gem. "I think your Dr. So-and-So is an overeducated jackass." Considering all the circumstances, the only reply I could make at the time was, "Do you really think he is overeducated?" With all these obstacles in our way, why not decide to let manufacturing plants go their way and we go ours. You certainly will recognize all this as exceedingly silly if the company with which we are concerned and on which we depend is to make any money, and if our company does not make any money, that fact is likely to interfere with some of our most ingrown habits—eating, for instance.

Why does our company need a factory anyhow? As I see it, there is only one reason. We must have facilities to produce a product that the public wants at a cost that the public can pay. All the efforts of the factory are concentrated in this direction. If all this is running along smoothly, why should the laboratory butt in? This is where we get down to cases. The laboratory's job is:

1. To improve the factory product, preferably without raising the cost, and even more, to lower the cost.
2. To supply technical information so that the plant can itself maintain or improve its product and processes.
3. To have new products ready when the old ones show signs of slipping. There are very few products in this country that go on forever unchanged and practically none that can go on forever unimproved.
4. To train men of the laboratory staff to fill jobs in the factory. This fourth subject is generally ignored, but I consider it one of the most important functions of a laboratory. Not only is it important that the plant build up its staff with men with a technical background, but think how much easier it makes the laboratory man's job when he can deal in the plants with men he trained himself. Think that one over!

From this you can see that laboratory relations with the plant represent what the sociologists call "A very nice bit of cooperative phenomena." If a solid basis for cooperation is not established, obviously our enterprise is not going to function with efficiency. Let's discuss the best means of securing effective cooperation.

The Proper Organization

For a laboratory to get smooth cooperation with the plant, it is first necessary to be sure that the laboratory or research department is properly set up from an organization standpoint with the top management of the enterprise. With all the wonderful examples of good organization in American industry in this respect, it is surprising how many research departments are still tied into the management in a most inefficient manner.

In some companies we find research reporting to production. A production man's idea of heaven is a factory where the raw material flows in one end and comes out as finished product at the other without any trouble or bother to the factory manager. This means that the production man is inclined to resent changes, because change represents at least temporary interruption to his ideal process. Being a production man, his main interest is in an uninterrupted flow of production now, and often he is not willing to take a temporary interruption to production in order to secure a better product or smoother operation in the future. Research should not report to production.

Sometimes we see research reporting to the engineering department of a corporation. By nature a good research man is said to be the type who can always see gold in the hills. An engineer, on the other hand, is a man trained to find the fly in the ointment. It takes a very rugged temperament in a research man to be working under the direction of a man who is constantly looking for flies in the research man's ointment, and certainly in the organization of an industrial enterprise the research organization should have at least equal standing with engineering.

It is not necessary to go into reasons why research should not report to any other operating department of the corporation. It should be apparent to every wide-awake management that research and development is a function in a corporation which should report to top management and be a part of top management. In more and more companies we are seeing research men represented on the board of directors, and with pleasing regularity we are finding research men reaching the position of operating head of the company.

Now if your company has not recognized the proper function of research and development in its organization, that is your first job, and no research manager or director should quit until his department is properly represented in the management.

If you are already set up in this way, you have won half the battle in your relations with the plants and you and your men will go into a plant with the feeling that your department has been considered by your management as being on a par with the production department.

* From a talk before the New York Section of the Institute of Food Technologists, May 4, 1944.

Get Acquainted

The next step in perfecting laboratory relations with the plant is to start preparations for these relations before you are ready to go to the plant to make any changes in its functions. This means that you should not spend all your time in your own laboratory and in visiting other laboratories and technical men. You should certainly broaden your acquaintance to include the manufacturing organization. By training, all of us tend to become introverted, and while I do not recommend a career of hand shaking and back slapping, it must be recognized that a business organization is not simply cold machinery for carrying out a manufacturing and distributing business, but is a social organization as well. Like all social organizations, it has its pride, its sentiments and its prejudices and you must learn what these are and how to deal with them.

You must take a cold look at the strong and weak points of the management of the plants and not neglect to take the same kind of a look at your own deficiencies and those of your subordinates. You can do this in your innumerable small contacts with plant personnel. You can find out the interests of the plant manager, the superintendent, the plant engineer and the personnel man and establish with these men the fact that you are also human, although it may not be apparent on first acquaintance. Remember always, that until you have broken down this reserve, the plant man looks upon you as a sort of gremlin who comes in with strange ideas and, if not watched closely, will mess things up thoroughly. Be very careful to learn his language and do not try to teach him your own unless he asks for it. You will always find some common ground from which to start.

It is a good thing to remember in securing cooperation with a plant man that, in general, a person would rather do you a favor than have a favor done for him. If the plant man thinks you are coming in to change him, he resents it, but if he thinks that he can help you do a job of improving his operation, then he will allocate some of the credit to himself and deservedly so, but this will in no way take any of the credit away from you.

The longer I work in this field, the more clearly industrial technical men divide themselves into three rather clear and distinctive classes:

1. The fundamental scientist, not greatly interested in the plant and unable to do much in a plant.

2. The technologist who learns the language of the plant quickly and who works with both persons and materials with a certain artistic sense. He is able to sell his ideas to the plant men and put them into effect with a minimum of disturbance. A man does not become a good technologist overnight.

3. The research engineer—the man who can find the flies in the production department's ointment. His job, of course, first calls for a sound engineering background. He should be able to go over a process like a skilled physician making a diagnosis. And when he has found out what is wrong, he should be able to suggest the remedy in such a way that the plant personnel does not feel that they individually and collectively have had their eyes wiped.

T. M. Rector at work in his office.

It is seldom worth while to try to convert the fundamental scientist into a man who can build up good laboratory relations with the plant. He needs the intermediate services of the technologist and the process engineer. The technologist and the engineer, in turn, need him very badly, and I feel it is not a good service to the scientist or the plant man to have them contact each other directly. Of course, let your fundamental scientist visit the plant for the purpose of securing information and broadening his viewpoint, but don't give him a license to change any operation.

Contact the Right Man

In making plant contacts, either by correspondence or personally, the technical man very often gets himself thoroughly in dutch by not observing the social amenities of a factory. In his concentrated effort to get something done, the technical man will try to eliminate necessary red tape, and one day the factory manager wakes up to find a control chemist or plant engineer is working on something at the request of the research department. No matter how well conceived this project may have been, the factory manager is rightly very much put out about the matter because he was not consulted. To prevent instances of this kind, be sure you have a thorough understanding with the responsible head of the plant as to just how he wishes to be contacted. The method I have found to be quite successful is to arrange matters so that any research man in the organization can write anyone in the factory organization for factual information, samples, and so forth, sending a copy of his letter to the responsible head of the plant. If, however, he wants the plant to do something that costs money and distracts the effort of the factory organization, then he should write the responsible head of the plant.

Recently, one of our men wrote directly to a plant control chemist requesting a series of analyses taking perhaps a week of this man's time. The production manager wrote me criticizing this action on the part of the research man, saying that this instance is just the same as if your neighbor called at your house and asked your maid to do a week's wash. I think he was perfectly right.

When you have worked out a new product or process or important change of any kind affecting production which requires the presence of research men in the plant, it is very important that you start with the factory manager. Give him a copy of your report, of course, but explain clearly what the objective is and ask him how he would like to work with you. Many plant managers are research men at heart and some of them will neglect their regular job in order to follow an interesting new development. This can be a help and it can also be a nuisance, and all of us have experienced a situation where the plant superintendent, plant engineer or someone else in the organization wants to do the research job all over again. That is why it is so important to convince the responsible head of the factory that the research is thoroughly done and that the problem is one of application of the research work to practical operation. Before trying to convince the factory manager, however, be sure that your research *has been* thoroughly done and that you are ready to apply it. You cannot do a very good job of convincing the plant unless you are sure of your own ground.

Causes of Trouble

Most of my troubles with plant operating executives have been due to trying to go too fast. Most factory managers, having made mistakes themselves, will forgive you for making one or two, but when you have three or four steps in a process and none of them work, you will find yourself viewed with suspicion even though you are able eventually to work out of your difficulties. In many cases, because of time limitation, you are obliged to go into a factory without thorough pilot plant work on your process. In that case, tell the plant man in advance where you expect trouble and if it comes, you have at least put yourself on record with him that you did not expect to be perfect. If the trouble comes, you have anticipated it, and if it does not come, you get all the more credit for it.

Many research engineers who have worked out a new process are inclined to pay too much attention to the new features of a process and take some of the old ones for granted. The result is that the new features usually work better than the old ones. This has a particularly bad effect on a factory manager because he already knows the old features and thinks very much less of you because you cannot make some conventional piece of equipment work the first time.

Tremendous Trifles

Here are some of the relatively minor things that have caused me trouble in the past. I should be very glad if a list of these things may save you trouble in the future.

1. The old chestnut of connecting a tank containing a valuable product directly with a sewer. This seems to be a standard practice with young chemical engineers, and I have even considered having a neon sign put up in every engineer's bedroom, reading: "Do not connect tanks containing valuable products to the sewer."

2. Overoptimistic cost estimates. Any one who has seen a cost estimate made by a good cost accountant knows how many items go to make up the total figure. If the research man does this job without the cooperation of the cost experts, he leaves out about half the small items. Most of us have a tendency to believe what we see written down in the form of a neat column of figures. Be sure, if you make cost estimates, that the error is on the high side instead of the low side.

3. Expecting too much cooperation. Many research men after saturating themselves with the merits of their projects expect the factory manager to be just as enthusiastic after a 20-minute explanation. You must remember that the factory man starts cold, and he was not put into his job because he jumps to conclusions. You cannot expect him to take everything you say at its face value and immediately disrupt his program in order to put yours into effect. If you do expect this, you are in for a lot of disappointments.

4. Poor housekeeping. Often a research man working in a plant has not been taught the merits of orderliness and cleanliness. A factory manager has a right to get upset when a research man comes in and violates every rule with respect to housekeeping. It is important to keep an orderly house even at the expense of some delay in the results.

5. Attention to the dollar sign. It is a strange thing that the research man who has been working in terms of exact measurements in the laboratory gets into the factory and forgets that the main objective is yield. Because he threw away byproduct residues in the laboratory, he also cheerfully throws down the sewer $489 worth of cow feed or some other equally valuable byproduct which the production man has been trained for years to preserve. When the research man is in the factory he should recognize that his is at least partly a production job, and in terms of the dollar sign he should learn to think like a production man.

6. Changing horses in the middle of the stream. This has been recognized as bad practice for centuries, but the research man cheerfully does this when he is on his own in the factory, often with disastrous results. Assuming that the research on a process has been sound and that the pilot-plant work has been well engineered, then the objective is put that particular process into operation. Yet we often find our research men trying to change the process in the middle and on large scale equipment. This leads the production man to the logical conclusion that the research department does not know its own mind, and that is not good for laboratory relations with the plant.

7. Thinking out loud. On a job in a plant, research men like to talk about the job, and they will often reveal to the more or less unsympathetic factory man what seems to be gross ignorance on things which are every-day occurrences to the factory man. I think it is good practice never to let a production executive catch you in the act of making up your mind. What he wants to see is the finished product and a neat row of figures showing how he can make more money as a result of your work.

This list, of course, could go on and on, but I think you have the general idea. It can be summed up in a very few words. When you go in a plant you are a guest and the plant manager and his staff are your hosts. If a guest is unobtrusive, interesting and helpful, he usually will be welcomed on his next visit.

I know of no more fitting way in which to end than to recite what I call the "Research Director's Prayer," stolen pretty much bodily from the closing prayer of a Mississippi colored preacher:

"Oh, Lord, give my servant the eyes of the eagle and the wisdom of the owl;
Connect his soul with the gospel telephone in the central skies;
Illuminate his brow with the sun of Heaven;
Poison his mind with love for the people;
Turpentine his imagination; grease his lips with 'possum oil and loosen his tongue with the sledge-hammer of Thy power;
Electrify his brain with the lightning of Your word;
Put perpetual motion in his arms; Fill him full of the dynamite of Thy glory;
Anoint him all over with the kerosene oil of Thy salvation and set him on fire."

If your prayer is answered and your research man is so inspired, he has nothing to worry about in his relations with the plant.

The British Develop Empire Foods

Expansion of canning plants and food research in the British Dominions not only is contributing to the progress of the war, but will be a factor in the peacetime world

By ERIC HARDY, Liverpool, England

FOOD production throughout the vast stretches of the British Empire is undergoing changes and developments to serve the stepped-up requirements of the Allied armed forces. Under the stress of wartime demands, food processing is becoming one of the largest industries in the Union of South Africa and research has had an important part in the development of the 50 companies now turning out canned products. The South African Institute for Medical Research, for instance, recently produced a new army biscuit that is palatable and easy to eat and which has a high vitamin B content. The Institute also devised a method for dehydrating and canning guaro fruits, as a source of vitamin C, for troops in the field. Other foods served to the South African army and the British navy are fortified with fish liver oil and soybean flour.

The Low Temperature Research Laboratory at Cape Town has added a new canning section, under the direction of Dr. G. M. Dreosti, to study the processing of South African fruits and other foods. Peaches, fish, vegetables and meat are also being investigated at this laboratory, which is to be expanded after the war. New methods have been devised for stabilizing the vitamin C content of concentrated orange juice under various conditions, and the manufacture of nonmelting vegetable soup cubes for use in hot climates has been improved. New methods also are being worked out for pulping fruit for pectin and for processing fruit juices.

Production Increases

The output of these South African canning factories continues to mount, stimulated as they are by the needs of the allied armies in Africa and India. Cardboard containers have been introduced to replace glass and tinplate in packing jam, lard, honey, cod liver oil, malt and peanut butter. Nearly 30,000,000 containers per year are needed by the South African jam packers alone. In 1943, jam production was 125,000,000 lb., compared with 56,000,000 lb. in 1940.

The South African canners are developing new markets in the Belgian Congo, and it is expected that after the war a certain amount of canning will be started in the Belgian colony. Capitalization has been completed for a large factory to exploit shark products of the Natal coast and produce vitamin A foods for Britain.

Australian Canners

Australia also has seen a noteworthy development in her food canning industry to meet the demands of war. The Australian canners are meeting the requirements of the allied forces in the southwest Pacific. Two of the new plants, erected in 1943, are devoted to processing food for the American forces in Australia and the South Seas. In order to protect the industry, the Australian government has made an agreement with the Australian Canned Food Board to meet any loss on unsold stocks of canned fruits caused by lack of shipping space. The government has also aided in the export of quantities of fruit pulp to Britain.

In 1942, the canned fruit pack in Australia included 2,125,042 cases of peaches and pears; a decline of 607,658 cases from the 1941 pack. This decline is attributed to shortage of man-power and to the conversion to pulp of fruit that ordinarily would have been canned. Canned apricots were eliminated entirely from the domestic market. In 1942, canned pineapple production reached 16,685 cases (2 doz. 30-oz. cans per case).

Cucumber Research

In Britain, recent contributions to food chemistry includes a study of cucumber and cucumber pickles which showed a decrease in the moisture content and an increase in the total solids in practically all varieties pickled. This was especially pronounced in sweet and in bread and butter pickles. A definite decrease was shown in the protein content and in the calcium and phosphorous content. In dill and salt-stock pickles, the simple carbohydrates were removed during the first four days of fermentation. During pickling, the carotene (provitamin A) content in-

(Turn to page 119)

Australian grown beans are here shown passing through the can filling operation in one of that country's many canning plants which are now being rapidly developed.

How To Chart Production Costs

PART I—With charts, a quick, efficient and accurate analysis of effect of variables on cost can be made. Here are some examples

By R. R. HAUGH, Consulting Engineer, Chicago, Ill.

DETERMINING the production cost of finished products is very uncertain because of its dependence on variables. Included among those variables are (1) percentage of moisture in the raw and in the finished product, (2) seasonal and regional variations in the cost of the raw product, and (3) plant losses in such operations as breaking, sorting, peeling and trimming. But with the aid of alignment charts, it is possible to make a quick efficient and accurate analysis of the effect of variations in such cost factors upon the unit cost of the finished product and upon the net profit or loss.

Such information shows clearly which combinations of cost and quality of raw materials will yield the greatest net profit. It can be used to analyze plant procedures and to improve production efficiency because it shows the effect of departmental or overall plant losses on net profit. And, finally, it can be used to predict the effectiveness of projected changes in plant procedure.

A single master alignment chart may be set up to include all phases of food processing from the quality and price of the raw product, through the various steps of plant procedure, to the unit cost of the finished product and the net profit of the process. Such a master chart shows the effect of variation of any combination of factors upon any other factor. For the purpose of illustrating the application of these charts, relatively simple ones will be used first. They will show the relationships between only a portion of the factors in egg drying.

Figure 1 shows the relationship between three variables: *A*, the average cost per case of eggs; *B*, the average weight of 360 shell eggs and 11½-lb. case; *C*, the cost per pound of powder produced. If the average weight of the cases is less than 11½ lb., the difference between that weight and 11½ lb. must be added to the average weight of the eggs plus case, before applying the weight to the chart. This chart assumes these constants: 26 percent solids in the liquid eggs; 5 percent moisture in the whole dried egg powder; and overall plant losses of 14 percent. In a more complete chart, of course, these assumed constants would also be represented as variables.

If one knows any two of the variables *A*, *B* or *C*, the third unknown variable may be obtained by drawing a straight line through the two known values. The point at which it cuts the line of the unknown variable will represent the value of that variable.

Example I—The effect of variations in the weights of eggs purchased upon the cost of the finished product is frequently underestimated. Suppose that cases weighing 56 lb. are contracted for at $10.50 per case, and that the cases actually delivered weigh 55 lb., only 1 lb. short of the weight contracted for. Draw a line from the point representing $10.50 on line *A* so that it passes through *B* at 56. This line will intersect line *C* at $1.00, and the cost of eggs per pound of dried egg powder will be $1.00. If another line is drawn from $10.50 on *A*, through 55 on *B*, it will intersect line *C* at $1.02½. The difference of 1 lb. in the weights of the cases of eggs purchased is seen to increase the cost of dried powder 2½ cents per pound. In the production of 10,000 lb. of powder, $250 will be lost. This example illustrates the importance of demanding correct weight on all cases, or of buying on a "loss off" basis.

Example II—Sometimes cost problems must be figured "backward." Suppose that dried egg powder were selling at $1.10 per pound and that the total cost of producing the product, including plant operation, overhead and reasonable profit, was 10 cents per pound. Given these conditions, one must know what combination of weight and cost per case of eggs will insure the 10-cent margin. The maximum cost of eggs per pound of powder purchased will be $1.00. If the weight of the eggs purchased is 54 lb. per case, a line drawn through *C* at $1.00, and *B* at 54, will cut *A* at $10.00. Consequently, the maximum price that can be paid for a 54-lb. case of eggs is $10.00. The same computation made on the basis of a 53-lb. case demonstrates that $9.75 is the maximum price that can be paid for a case of this weight.

Example III—The daily cost of producing dried powder can be computed readily. Using the average cost per case for the day and the average weight per case of eggs (taking the corrected figure of 11½ lb. for the case itself, as indicated above), the average cost of eggs per pound of powder produced that day will be obtained. To this will be added the fixed cost of plant operations and overhead per pound of powder.

Figure 2 shows the relationship between three variables: *D*, the average weight of shell eggs and an 11½-lb. case; *E*, total plant losses in percent; and *F*, yield in pounds of powder per case of eggs. The constants assumed are: liquid eggs with 26 percent solids; dried eggs with 5 percent moisture.

Example IV—The average weight per case of eggs (minus weight of rejected eggs) and of egg powder per case can be obtained from production records. Given this data, the percent of loss in the plant can be obtained in the usual manner of drawing a straight line through the appropriate points on lines *D* and *F*. The point at which this line intersects line *E* will give plant processing losses in percent.

Example V—Since plant losses do not fluctuate greatly from day to day, the yield of egg powder for any weight of case can be predicted for any day's operation. Thus a line drawn from the average weight per case of eggs used, through the assumed percentage of plant losses on *E*, will give the yield, or pounds of egg powder per case to be expected.

Figure 3 shows the relationship between three variables: *G*, the average weight of shell eggs and an 11½-lb. case; *H*, breaking-room losses in percent; and *I*, average weight of liquid per case.

Example VI—The breaking-room losses can be determined on the basis of the average weight of shell eggs (minus spoiled eggs and liquid) and the average weight of liquid yielded per case, figures which can be obtained from production records. The largest variable factor of breaking room loss is the liquid that is thrown away with the shell after breaking. With this chart, it is possible to evaluate the economy of speeding up breaking-room operations and also the economy of different systems of breaking.

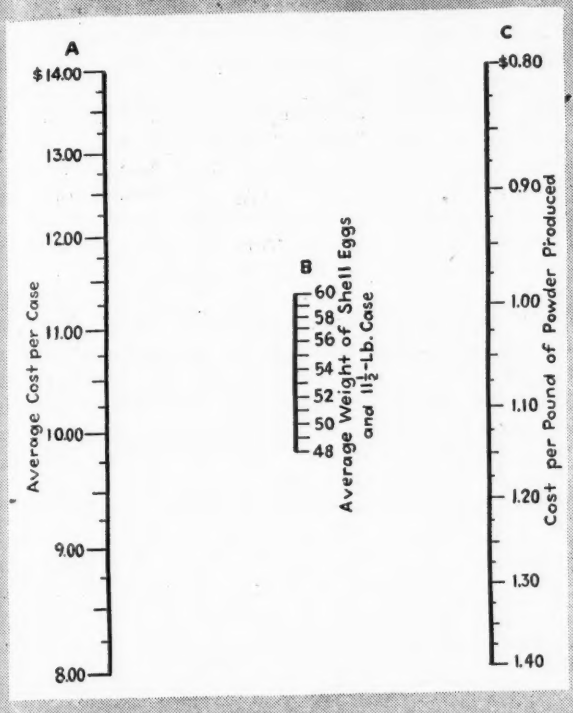


FIG. 1. Relationship between cost of eggs, weight and cost of powder. Constants: 26 percent solids, 5 percent moisture, 14 percent breaking losses.

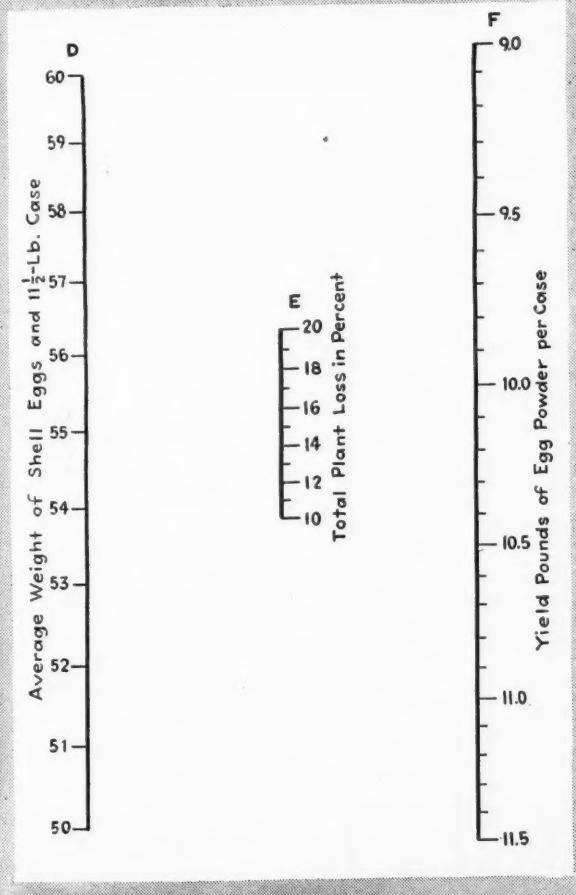


FIG. 2. Relationship between weight, losses and yield. Constants: 26 percent solids, 5 percent moisture.

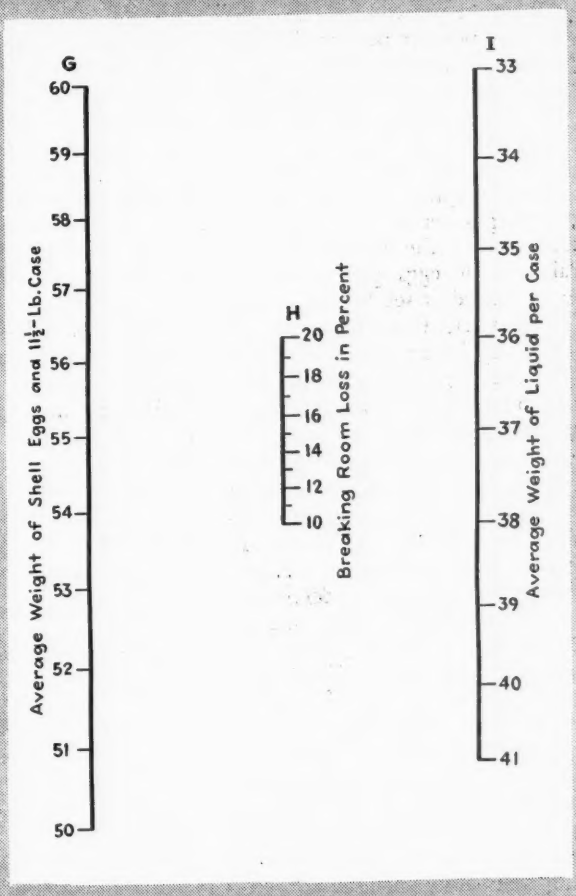


FIG. 3. Relationship between weight of eggs, breaking room losses and weight of liquid. Constants: 26 percent solids, 5 percent moisture.

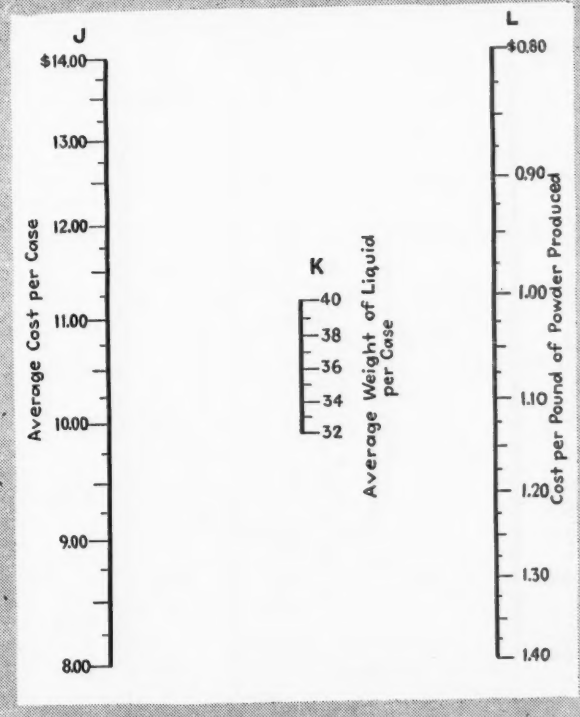


FIG. 4. Relation of cost per case and weight of liquid to cost of powder. (26 percent solids, 5 percent moisture)

The variables in Fig. 4 are *J*, the average cost per case; *K*, the average weight of liquid per case; *L*, the cost per pound of powder produced. The constants are 26 percent solid in liquid eggs and 5 percent moisture in powder. The average cost per case and the average yield of liquid per case can be obtained from production records and employed to determine the cost of eggs per pound of powder produced. Since the maximum economical cost of eggs per pound of powder produced is set by the selling price of powder, this chart can be used to figure backwards, and determine the maximum economical price that can be paid for eggs yielding a known weight of liquid per case.

Figure 5 is a master alignment chart which shows the relationship between nine variables, with no constants assumed. The variables *A*, *B* and *D* are derived from production records. These variables are used to determine other variables which cannot be arrived at directly. *C*, the average weight of liquid per case, and *G*, the weight of liquid egg per pound of powder, are "pivot" lines. They have no direct significance of themselves, but are intermediaries in determining significant factors from data such as *A*, *B*, *H* and I. For instance, A the average weight of shell eggs, and *B*, the percent of breaking room loss, are used to determine *C*, the average weight of liquid per case. *G*, the weight of liquid per pound of powder, can be determined from *H* (percent solid in liquid eggs) and *I* (percent moisture in dried eggs). The two pivot lines *C* and *G* thus determined may be used to find other variables. A line joining the pivot lines and *C* and *G* will determine the yield in pounds of powder per case of eggs on pivot line *E*. This figure, combined with average cost per case of eggs, *D* or *D'*, yields the cost of eggs per pound of powder produced, on *F* or *F'*.

Example VII—Suppose that one wishes to find the cost of eggs per pound of powder in a given instance. To obtain this figure (*F*) one must know *A*, *B*, *C*, *D*, *E*, *G*, *H* and *I*. *A*, *B* and *D* are derived from production records, and *H* and *I* from laboratory reports. In this instance in question they are:

A, average weight of shell eggs and case ..... 55 lb.
B, breaking-room loss ..... 14 percent
D, average cost per case $9.90
H, percent of solids in liquid eggs, 26 percent
I, percent of moisture in dried eggs ..... 5 percent

A line drawn from 55 on line *A* through 14 on line *B* will intersect *C* at 37.3, giving the average weight of liquid egg yielded per case. Similarly, a line drawn from 5 on line *I* through 26 on line *H* intersects *G* at 3.654, giving the pounds of liquid eggs per pound of powder. By this means we have found the "pivot" points C and G which, in turn, are used to find *E*, the yield of pounds of powder per case. *E*, derived by this means, is 10.2. The final step of finding the cost of eggs per pound of powder produced is accomplished by drawing a line from $9.90 on *D* through 10.2 on *E*. This line will cut *F* at $0.972, giving the cost of eggs per pound of powder produced. This figure when subtracted from the selling price of powder gives the spread.

The cost of eggs per pound of powder produced, for *F'*, depends directly on the average cost per case, *D'*, and the yield in pounds of powder per case, *E*. The yield in pounds of powder produced per case, *E*, depends directly on the average weight of liquid per case, *C*, and the pounds of liquid per pound of powder, *G*. The average weight of liquid per case, *C*, depends directly on the average weight of shell eggs, *A*, and breaking room loss in percent, *B*. The pounds of liquid eggs per pound of powder, *G*, depends directly on the percent of solids in the liquid eggs, *H*, and the percent of moisture in the dried eggs, *I*.

Editor's Note: Part II of this article will appear in the July issue. It covers the use of alignment charts in the analysis of production rates and production yields in dehydrating plants.

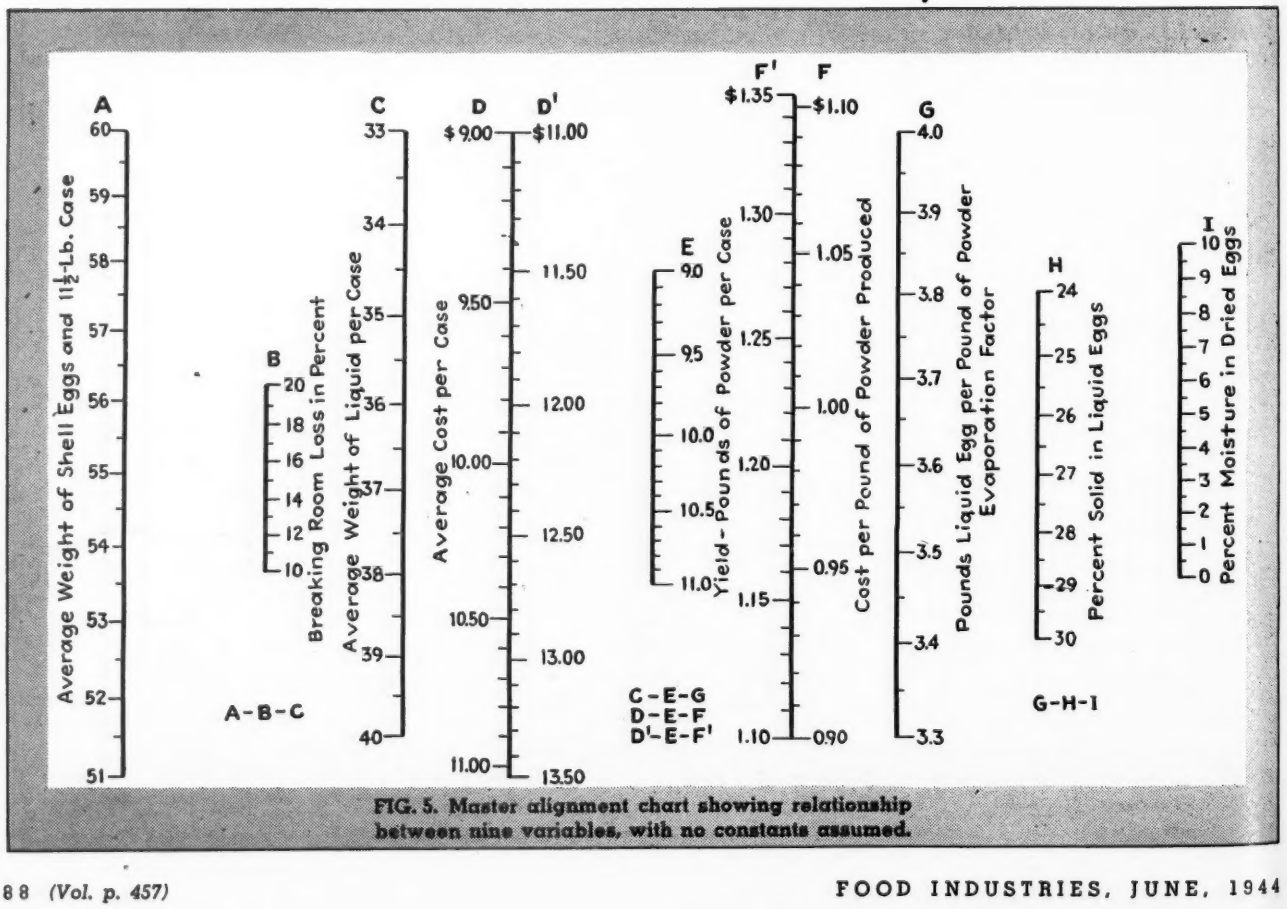


FIG. 5. Master alignment chart showing relationship between nine variables, with no constants assumed.

New Facts About Packaging And Storing Dehydrated Foods

By MEMBERS OF THE RESEARCH STAFF, Research Laboratories, Continental Can Co., Chicago, Ill.

Dehydrated cabbage is quite palatable as boiled cabbage. It is high in vitamin C and a good source of vitamin B_1. It will keep at least six months packaged in inert gas if storage temperature is not over 80 deg. F.

PART V—DEHYDRATED CABBAGE

DEHYDRATED cabbage can be reconstituted to make a fairly attractive food. If eaten as boiled cabbage it is quite palatable, although not comparable in all respects to that prepared from the fresh product as ordinarily purchased. Dehydrated cabbage is, however, an excellent source of ascorbic acid (vitamin C) and a good source of thiamine (vitamin B_1).

It can be kept in a satisfactory condition for at least 6 months, and possibly a little longer, if it is packaged in an inert atmosphere and the storage temperature does not exceed 80 deg. F. Under these conditions it retains about 60 percent of its initial ascorbic acid and 60 percent of its intial thiamine content.

Dehydrated cabbage is very sensitive to temperatures above 80 deg. F. Its general quality is appreciably reduced in less than 3 months by temperatures as low as 98 deg. F. Storage at 130 deg. F. makes the product inedible in a few weeks.

The foregoing statements are conclusions based upon the results of examinations through one year's storage.

Dehydrated cabbage for this experimental pack was secured from a portion of the Dec. 16, 1942, commercial run at the F. B. Huxley and Son plant at Ontario, N. Y. It was taken to the New York State Agricultural Experiment Station, at Geneva, to be packed in cans under various conditions. This cabbage was of the Danish type. It was grown to full maturity in the vicinity of Rochester, N. Y., and had been stored for about one month.

The heads were prepared for dehydration by trimming off the outer leaves, coring and then cutting in a kraut shredder into strips approximately $\frac{3}{16}$ in. wide. After the strips were loaded on trays, they were blanched for $4\frac{3}{4}$ minutes at approximately 205 deg. F. in steam. The product was dehydrated in a center-exhaust tunnel of the Eidt design within 7 hours total time. The temperature of the air in the secondary section of this tunnel was about 135 deg. F. No finishing bins were used, since the product was discharged from the tunnel at a moisture content of approximately 3.8 percent. The product was hermetically sealed in air in

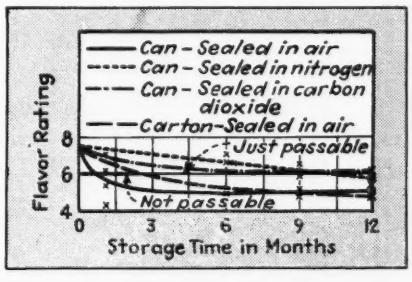


FIG. 1. Effect of storage time and packaging on flavor rating of dehydrated cabbage (regular moisture content) stored at 75 to 80 deg. F.

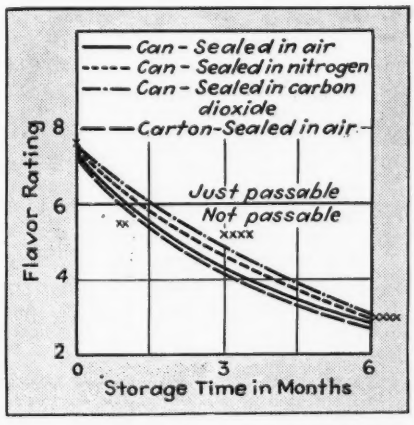


FIG. 2. Effect of storage and packaging on flavor rating of dehydrated cabbage (regular moisture content) which was stored at 98 deg. F.

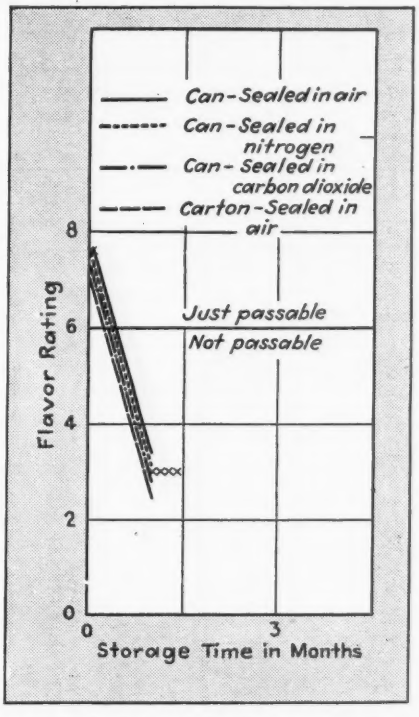


FIG. 3. Effect of storage and packaging on flavor of dehydrated cabbage (regular moisture content) stored at 130 deg. F.

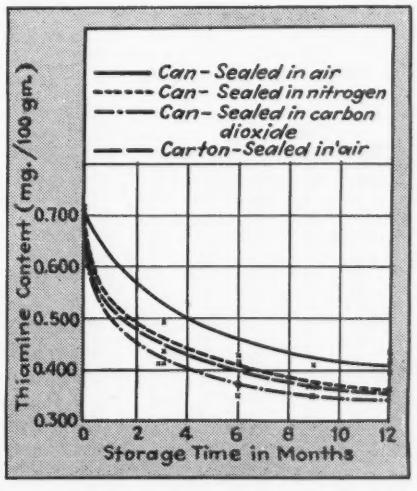

Can - Sealed in air
Can - Sealed in nitrogen
Can - Sealed in carbon dioxide
Carton-Sealed in air
Thiamine Content (mg./100 gm.)
Storage Time in Months

FIG. 4. Effect of storage time and packaging on thiamine content of dehydrated cabbage (regular moisture content) stored at 75 to 80 deg. F.

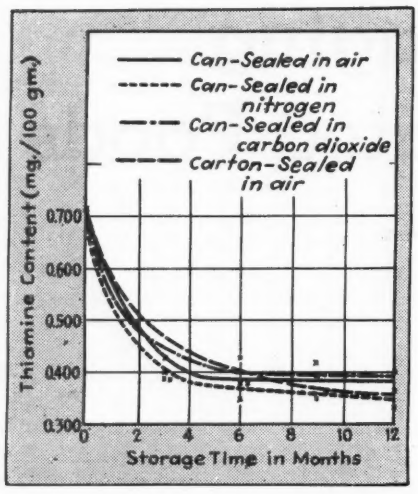


FIG. 5. Effect of storage time and packaging on thiamine content of dehydrated cabbage (regular moisture content) stored at 98 deg. F.

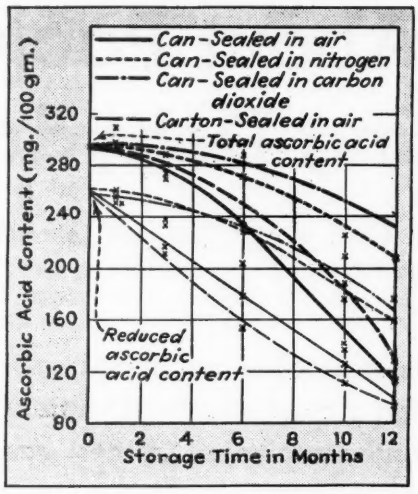


FIG. 6. Effect of storage time and packaging on total and reduced ascorbic acid content of dehydrated cabbage (regular moisture content) stored at 75 to 80 deg. F.

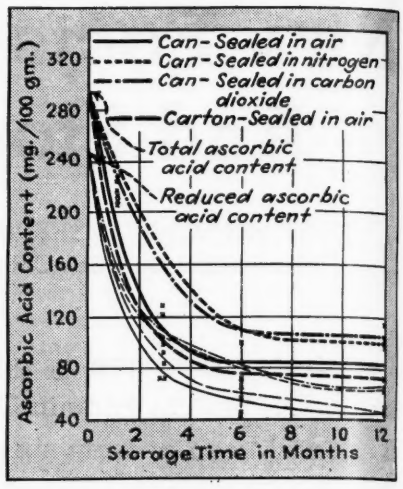


FIG. 7. Effect of storage time and packaging on total and reduced ascorbic acid content of dehydrated cabbage (regular moisture content) stored at 98 deg. F.

TABLE IA—Results of Examinations of Dehydrated Cabbage.

Storage at 75–80 deg. F. (room temperature)

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent

Catalase activity—both A and B—negative

Storage time	Package	Flavor rating		Drained weight (grams)		Color (dry product) % N 1 (black)		% 5 YR 6/12 (orange)		% 5 Y 9/14 (yellow)		% N 9.5 (white)	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—air	7.5	7.5	..	..	..	..	..	..	..	..	..	..
	Can—N_2	7.5	7.5	..	..	..	..	..	..	..	..	..	..
	Can—CO_2	7.5	7.5	..	..	..	..	..	..	..	..	..	..
	Carton	7.5	7.5	..	..	..	..	..	..	..	..	..	..
1 month	Can—air	4.3	6.5	71	82	38	33	8	18	37	28	17	21
	Can—N_2	7.0	7.0	101	89	36	35	5	14	42	31	17	20
	Can—CO_2	6.1	6.6	90	84	41	35	10	14	30	31	19	20
	Carton	5.3	6.1	79	78	40	37	16	13	28	33	16	17
3 months	Can—Air	...	...	95	84	53	50	1	6	30	28	16	16
	Can—N_2	...	...	82	86	53	45	2	7	32	32	13	16
	Can—CO_2	...	...	96	85	53	48	1	6	30	29	16	17
	Carton	...	...	107	88	55	50	3	6	29	27	13	17
6 months	Can—Air	5.2	6.3	91	92	43	53	8	14	32	18	17	15
	Can—N_2	7.0	6.5	75	84	43	48	15	12	25	24	17	16
	Can—CO_2	6.6	6.9	88	90	42	50	7	9	35	27	16	14
	Carton	6.6	5.8	124	87	43	50	21	15	23	22	13	13
9 months	Can—Air	5.0	5.5	91	91	38	37	17	21	27	25	18	17
	Can—N_2	5.9	6.4	89	92	44	33	18	18	23	30	15	19
	Can—CO_2	6.4	6.4	82	90	39	36	21	16	23	29	17	19
	Carton	5.2	5.5	89	90	39	40	24	25	22	23	15	12
12 months	Can—Air	5.6	6.3	72	66	30	41	24	19	30	24	16	16
	Can—N_2	5.8	6.5	74	70	22	34	22	20	34	29	22	17
	Can—CO_2	6.1	6.1	73	67	22	30	26	21	30	32	22	17
	Carton	4.9	4.7	71	63	23	40	26	23	29	22	22	15

TABLE IB—Results of Examinations of Dehydrated Cabbage.

Storage at 75–80 deg. F. (room temperature)

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent

Catalase activity—both A and B—negative

Storage time	Package	Vitamin—content (mg./100 gm.) Thiamine		Ascorbic acid Reduced		Total		Gas analyses Percent O_2		Percent CO_2		pH	
		A	B	A	B	A	B	A	B	A	B	A	B
Initial examination	Can—Air	.....	.....	...	...	...	...	....	....	....	....	...	...
	Can—N_2	0.710	0.607	261	270	295	319	1.4	1.2	0.2	0.3	...	...
	Can—CO_2	0.710	0.607	261	270	295	319	....	....	....	....	...	...
	Carton	.....	.....	...	...	...	...	....	....	....	....	...	...
1 month	Can—Air	.....	.....	249	251	296	318	....	....	....	....	5.8	5.8
	Can—N_2	.....	.....	258	259	307	304	....	....	....	....	5.8	5.8
	Can—CO_2	.....	.....	256	268	293	313	....	....	....	....	5.7	5.8
	Carton	.....	.....	249	259	293	314	....	....	....	....	5.7	5.8
3 months	Can—Air	0.491	0.435	217	199	278	266	....	....	....	....	5.7	5.7
	Can—N_2	0.437	0.428	238	234	288	260	....	....	....	....	5.7	5.7
	Can—CO_2	0.417	0.427	235	242	274	278	....	....	....	....	5.7	5.6
	Carton	0.419	0.385	214	198	270	272	....	....	....	....	5.7	5.6
6 months	Can—Air	0.420	0.375	179	143	236	250	16.9	17.7	3.2	2.8	5.5	5.5
	Can—N_2	0.372	0.378	235	184	273	264	1.5	1.8	1.7	1.3	5.6	5.6
	Can—CO_2	0.356	0.409	204	205	284	280	1.4	1.7	92.2	91.1	5.5	5.6
	Carton	0.421	0.368	157	134	233	244	....	....	....	....	5.5	5.5
9 months	Can—Air	0.366	0.422	128*	91	143*	188	15.1	11.8	1.3	4.1	5.4	...
	Can—N_2	0.411	0.465	178*	186	210*	211	0.9	0.7	2.7	3.0	5.4	...
	Can—CO_2	0.353	0.391	151*	198	227*	248	1.4	1.3	91.7	90.9	5.4	...
	Carton	0.365	0.392	114*	146	189*	154	....	....	....	....	5.4	...
12 months	Can—Air	0.441	0.338	102	88	117	136	12.3	11.6	5.5	5.2	5.6	5.2
	Can—N_2	0.367	0.436	161	188	213	219	0.7	0.8	3.5	2.4	5.4	5.3
	Can—CO_2	0.394	0.442	178	207	242	169	1.2	1.3	91.2	92.0	5.5	5.3
	Carton	0.415	0.417	100	120	125	144	....	....	....	....	5.5	5.3

*This set of samples analyzed for ascorbic acid at 10 months' storage instead of 9 months.'

5-gal. square cans and then immediately taken to Geneva where the experimental pack was made the following day, Dec. 17, 1942.

The staff of the New York State Agricultural Experiment Station assisted in making the experimental pack. One-half of the total amount of cabbage was placed in an experimental dehydrater at the Experiment Station to reduce the moisture content further. The product was held in this dehydrater for 5 hours in air at a temperature of 130 deg. F. and about 7 percent relative humidity. Subsequently, analysis showed that the moisture content had been reduced to approximately 2.9 percent by this treatment.

The lots of dehydrated cabbage at the two moisture levels were then packaged separately. Only 211x414 cans were packed at Geneva, but a sufficient number of those hermetic-

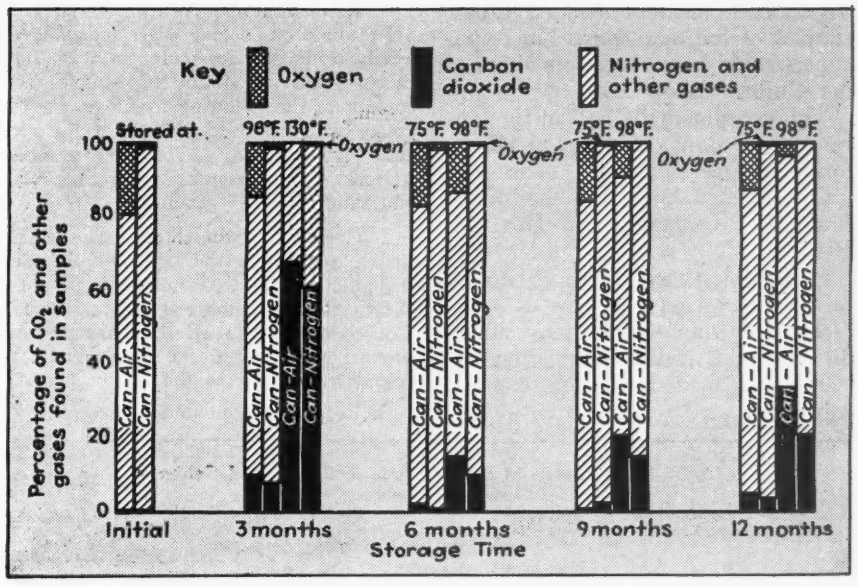


FIG. 8. Effect of storage time and temperature on evolution of carbon dioxide by dehydrated cabbage (regular moisture content) packed in air and in nitrogen.

TABLE IIA—Results of Examinations of Dehydrated Cabbage.

Storage at 98 deg. F.

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent.

Catalase activity—both A and B—negative

Storage time	Package	Flavor rating A	Flavor rating B	Drained weight (grams) A	Drained weight (grams) B	Color (dry product) % N 1 (black) A	% N 1 (black) B	% 5R 4/14 (red) A	% 5R 4/14 (red) B	% 5 YR 6/12 (orange) A	% 5 YR 6/12 (orange) B	% 5 Y 9/14 (yellow) A	% 5 Y 9/14 (yellow) B	% N 9.5 (white) A	% N 9.5 (white) B
Initial examination	Can—Air	7.5	7.5	..	..	..	..	..	..	..	..	..	..	..	..
	Can—N_2	7.5	7.5	..	..	..	..	..	..	..	..	..	..	..	..
	Can—CO_2	7.5	7.5	..	..	..	..	..	..	..	..	..	..	..	..
	Carton	7.5	7.5	..	..	..	..	..	..	..	..	..	..	..	..
1 month	Can—Air	5.3	6.6	..	81	44	29	..	..	18	24	24	31	14	16
	Can—N_2	6.3	6.5	..	87	45	36	..	..	10	28	29	25	16	11
	Can—CO_2	6.4	7.1	..	82	46	31	..	..	10	23	28	28	16	18
	Carton	5.3	6.1	..	96	41	32	..	..	13	22	27	30	19	16
3 months	Can—Air	5.1	Inedible	78	73	54	55	..	..	27	26	13	10	6	9
	Can—N_2	5.1	Inedible	71	76	52	59	..	..	24	22	16	13	8	6
	Can—CO_2	5.1	Inedible	74	76	52	59	..	..	24	22	16	13	8	6
	Carton	5.1	Inedible	72	73	52	59	..	..	24	22	16	13	8	6
6 months	Can—Air	Inedible	Inedible	65	65	64	61	5	10	19	16	8	8	4	5
	Can—N_2	Inedible	Inedible	63	66	53	57	6	6	22	19	14	13	5	5
	Can—CO_2	Inedible	Inedible	61	70	61	58	4	6	22	18	8	12	5	6
	Carton	Inedible	Inedible	74	59	58	53	5	4	24	24	9	12	4	7
9 months	Can—Air	Inedible	Inedible	..	..	55	58	..	..	34	31	5	5	6	6
	Can—N_2	Inedible	Inedible	..	..	53	56	..	..	34	32	7	6	6	6
	Can—CO_2	Inedible	Inedible	..	..	50	51	..	..	38	36	5	6	7	7
	Carton	Inedible	Inedible	..	..	67	59	..	..	26	31	3	4	4	6
12 months	Can—Air	Inedible	Inedible	49	49	61	65	8	4	24	26	6	3	1	2
	Can—N_2	Inedible	Inedible	49	52	61	56	8	4	21	35	9	3	1	2
	Can—CO_2	Inedible	Inedible	48	52	61	62	8	4	21	24	9	8	1	2
	Carton	Inedible	Inedible	46	51	64	74	8	4	22	16	5	4	1	2

TABLE IIB—Results of Examinations of Dehydrated Cabbage.

Storage at 98 deg. F.

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent

Catalase activity—both A and B—negative

Storage time	Package	Vitamin content (mg./100 gm.) Thiamine A	Thiamine B	Ascorbic acid Reduced A	Reduced B	Ascorbic acid Total A	Total B	Gas analyses Percent O_2 A	Percent O_2 B	Percent CO_2 A	Percent CO_2 B	pH A	pH B
Initial examination	Can—Air	.....	.....	...	...	...	...	....	....	....	....	...	...
	Can—N_2	0.710	0.607	261	270	295	319	1.4	1.2	0.2	0.3	...	...
	Can—CO_2	0.710	0.607	261	270	295	319	....	....	....	....	...	...
	Carton	.....	.....	...	...	...	...	....	....	....	....	...	...
1 month	Can—Air	.....	.....	185	138	206	176	....	....	....	....	5.6	5.6
	Can—N_2	.....	.....	208	206	234	253	....	....	....	....	5.7	5.6
	Can—CO_2	.....	.....	186	204	212	246	....	....	....	....	5.6	5.6
	Carton	.....	.....	205	170	230	208	....	....	....	....	5.7	5.6
3 months	Can—Air	0.428	0.426	73	87	81	98	14.8	13.6	10.7	11.4	5.5	5.5
	Can—N_2	0.405	0.454	104	121	127	134	1.4	0.7	7.4	9.4	5.5	5.4
	Can—CO_2	0.394	0.473	97	127	121	134	1.1	0.9	92.0	92.7	5.4	5.4
	Carton	0.391	0.435	75	77	86	95	....	....	....	....	5.4	5.4
6 months	Can—Air	0.385	0.338	43	35	68	73	12.0	12.6	15.2	14.0	5.1	5.0
	Can—N_2	0.349	0.350	70	69	101	86	0.4	1.1	10.9	10.8	5.2	5.0
	Can—CO_2	0.418	0.332	61	53	76	93	0.7	1.1	93.3	93.0	5.0	5.1
	Carton	0.387	0.346	46	30	55	57	....	....	....	....	5.1	5.0
9 months	Can—Air	0.395	.....	...	...	...	...	8.7	5.9	21.0	24.0	...	...
	Can—N_2	0.311	.....	...	...	...	...	0.5	0.4	14.2	15.2	...	...
	Can—CO_2	0.363	.....	...	...	...	...	0.7	0.6	93.6	91.7	...	...
	Carton	0.416	.....	...	...	...	...	....	....	....	....	...	...
12 months	Can—Air	0.396	0.442	51	66	97	93	2.8	2.4	32.7	32.0	4.9	4.6
	Can—N_2	0.359	0.384	61	58	98	93	0.2	0.3	20.6	22.6	4.9	4.6
	Can—CO_2	0.401	0.329	64	73	115	104	0.4	0.1	94.4	95.0	4.8	4.7
	Carton	0.329	0.421	45	66	73	116	....	....	....	....	4.6	4.4

ally sealed in air were included so that samples of the new Army 3-in-1 containers could be packed from them at the Chicago laboratories.

The experimentally packed tin cans were received in the Chicago laboratories on Dec. 22, 1942. The pack was completed, including the substitute paper containers, on Dec. 24, 1942.

All samples were placed in storage on the latter date.

The following modifications and additions to the regular examination procedure were made in the course of this experiment:

1. Reconstitution: All the flavor and pH readings on cooking water and drained weight readings were secured from cooked cabbage prepared from the samples according to the following formula: To 10 grams of cabbage add 150 c.c. of a 1 percent salt solution. Allow the product to soak for 20 minutes, bring to a boil and simmer for 15 minutes.

2. Color: The Munsell disks required to match adequately the color of the dehydrated cabbage were not on hand until shortly after the storage study was started. Consequently, data on the color of the original samples are not available. All color ratings refer to the dry product.

3. Because the product stored at 130 deg. F. deteriorated so rapidly, examinations of these samples were discontinued after 3 months.

TABLE IIIA—Results of Examinations of Dehydrated Cabbage.

Storage at 130 deg. F.

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent
Catalase activity—both A and B—negative

Storage time	Package	Flavor rating A	Flavor rating B	Drained weight (grams) A	Drained weight (grams) B	Color (dry product) % N. 1 (black) A	% N. 1 (black) B	% 5 YR 6/12 (orange) A	% 5 YR 6/12 (orange) B	% N. 9.5 (white) A	% N. 9.5 (white) B
Initial examination	Can—Air	...	...	..	..	..	..	..	..	..	..
	Can—N_2	7.5	7.5	..	..	..	..	..	..	..	..
	Can—CO_2	7.5	7.5	..	..	..	..	..	..	..	..
	Carton	...	...	..	..	..	..	..	..	..	..
1 month	Can—Air	Inedible		..	..	82	88	17	11	1	1
	Can—N_2	Inedible		..	..	81	89	18	10	1	1
	Can—CO_2	Inedible		..	..	85	81	14	18	1	1
	Carton	Inedible		..	..	..	..	..	..	..	..
2 months	Can—Air	Inedible		27	33	95	96	5	4	..	..
	Can—N_2	Inedible		29	30	92	93	7	7	1	..
	Can—CO_2	Inedible		13	28	94	91	6	8	..	1
	Carton	Inedible		..	..	..	..	..	..	..	..
3 months	Can—Air	Inedible		..	..	95	95	5	5	..	..
	Can—N_2	Inedible		..	..	95	95	5	5	..	..
	Can—CO_2	Inedible		..	..	95	95	5	5	..	..
	Carton	Inedible		..	..	..	..	..	..	..	..

TABLE IIIB—Results of Examinations of Dehydrated Cabbage.

Storage at 130 deg. F.

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent
Catalase activity—both A and B—negative

Storage time	Package	Vitamin content (mg./100 gm.) Thiamine A	Thiamine B	Ascorbic acid Reduced A	Reduced B	Total A	Total B	Gas analyses % O_2 A	% O_2 B	% CO_2 A	% CO_2 B	pH A	pH B
Initial examination	Can—Air	.....	.....	...	...	...	...	...	...	...	...	...	...
	Can—N_2	0.710	0.607	261	270	295	319	1.4	1.2	0.2	0.3	...	...
	Can—CO_2	0.710	0.607	261	270	295	319	...	...	...	...	...	...
	Carton	.....	.....	...	...	...	...	...	...	...	...	...	...
1 month	Can—Air	.....	.....	86	117	110	148	1.8	1.5	42.0	47.8	...	...
	Can—N_2	.....	.....	80	120	109	188	0.5	0.3	33.8	36.5	...	...
	Can—CO_2	.....	.....	63	112	109	152	0.2	0.5	95.7	96.1	...	...
	Carton	.....	.....	...	...	...	...	...	...	.....	.....	...	...
2 months	Can—Air	.....	.....	...	...	...	...	0.3	0.0	63.7	59.5	4.3	4.3
	Can—N_2	.....	.....	...	...	...	...	0.1	0.2	47.2	51.8	4.3	4.3
	Can—CO_2	.....	.....	...	...	...	...	0.4	0.3	95.7	95.7	4.2	4.2
	Carton	.....	.....	...	...	...	...	...	...	.....	.....	...	...
3 months	Can—Air	.....	.....	...	...	...	...	0.4	0.3	67.5	65.8	...	...
	Can—N_2	.....	.....	...	...	...	...	0.3	0.2	61.1	57.1	...	...
	Can—CO_2	.....	.....	...	...	...	...	0.2	0.1	96.8	96.0	...	...
	Carton	.....	.....	...	...	...	...	...	...	.....	.....	...	..

TABLE V—Dehydrated Cabbage.

Results of periodic moisture determinations

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent

Storage time	Storage temperature (deg. F.)	Package	Moisture content (percent of total weight) A	Moisture content (percent of total weight) B
Initial examination		.....	4.0	2.9
1 month	98	Carton*	4.1	4.1
3 months	98	Carton*	4.0	...
6 months	98	Can—Air	4.4	...
6 months	98	Can—N_2	4.2	...
6 months	98	Carton*	4.7	...
6 months	75–80	Can—Air	3.4	...
6 months	75–80	Can—N_2	3.8	...
6 months	75–80	Carton	3.5	...
9 months	98	Can—Air	4.3	3.8
9 months	98	Can—N_2	4.3	3.9
9 months	98	Carton*	6.6	5.5
9 months	75–80	Can—Air	3.0	2.5
9 months	75–80	Can—N_2	3.5	2.6
9 months	75–80	Carton	3.2	2.5
12 months	98	Can—Air	5.2	4.9
12 months	98	Can—N_2	5.2	5.6
12 months	98	Carton*	8.3	7.6
12 months	75–80	Can—Air	4.1	3.7
12 months	75–80	Can—N_2	4.4	3.3
12 months	75–80	Carton	4.0	4.5

*The paper packages stored at 98 deg. F. were also subjected to a relative humidity of 93 percent.

Summary of Results

1. Effect of Packaging—In general, the flavor testers indicated a preference for the product which had been gas-packed. Also, the ascorbic acid content of the product was retained better in the gas-packed packages than in those which were air-packed.

There was no consistent difference between the samples packed in nitrogen and those in CO_2. Moreover, the only essential difference between the samples hermetically sealed in air and those packed in paper containers was that the latter absorbed appreciable amounts of water when stored at 98 deg. F. and 93 percent relative humidity. This absoption was greatest after 6-months' storage. However, the effect of this increase in moisture content on the quality of these samples was not apparent.

2. Effect of Storage Time and Temperature—The dehydrated cabbage deteriorated very quickly when stored at 130 deg. F. It had become inedible and very dark in color after only a few weeks at this temperature. Moreover, the product would no longer reconstitute readily as evidenced by the marked decline in drained weight. It was also interesting to find that the pH of the cooking liquors decreased from about 5.8 to 4.3 at this temperature. Storage at 98 deg. F. had the same general effect but to a lesser degree. However, even at this temperature the product was no longer suitable for eating after 3 months. At ordinary room temperature, the product remained in fair condition for almost 9 months but by the time it had been stored for a year it was no longer very attractive, although still palatable. Very large amounts of CO_2 were given off by the product stored at elevated temperatures, building up a pressure in the packages. The air-packed cans stored at 130 deg. F.

(Turn to page 135)

TABLE IV—Dehydrated Cabbage.

Results of periodic weighings of products packed in paper containers and stored at 98 deg. F. and 93 percent relative humidity.

A—Regular moisture content—4.0 percent
B—Lower moisture content—2.9 percent

Storage time	Number of samples weighed A	Number of samples weighed B	Average percent increase in products weight over original* A	Average percent increase in products weight over original* B
Initial examination	14	14	....	....
1 month	12	12	0	0
3 months	10	10	0	0
6 months	8	7	0.74	0.53
9 months	5	5	2.47	2.29
12 months	5	5	3.87	3.83

*These figures are corrected for the weight of water absorbed by the paper in the containers (4 percent increase in container weight in 5 days).

EDITORIALS

LAURENCE V. BURTON, Editor

Be Dynamic or Die

It would be wonderful—in fact, Utopia—if, after we attain a comfortable level in life, we could just stop there, relax and bask in the sunshine of our past endeavors. But no man, no business, no economy and no government ever can enjoy that blissful state—for long. If this bloodiest of all wars teaches us nothing else, it should teach us that. Like a squirrel in a revolving cage, you have to go forward to stay where you are. That, come to think of it, has been the fundamental rule of nature since the beginning of time. Nothing that ceases to be dynamic stays where it is or what it is, but degenerates.

Before the war, the isolationists tried to freeze our democracy at the blissful level we had attained. We all know too well what happened. There were some who wanted to freeze our national economy—to set up Federal laws and regulations and taxes and tariffs to preserve the weak in the business world and to restrain the strong. Would that we could repeal the laws of nature!

We have learned, the hard way, that as a democracy we must be dynamic or die. But do we realize that our economic system, too, must be dynamic or deteriorate? Certainly the job industry in this country has done in war production has dramatically demonstrated what a dynamic economy can accomplish. What must an economy have to be dynamic? It must have industries and businesses and men that forever forge ahead that see new opportunities and gamble their resources on a project calculated to realize those opportunities. There must be that desire to risk to gain. And our government, our social system and our economic setup must permit, even encourage, the taking of those risks. Otherwise, we lose our forward drive, we slow down and stop, and degenerate like the dead products of nature.

Either we are dynamic or we die. Either we take risks and gamble our resources and get ahead or we deteriorate. To be sure, it is the old law of survival of the fittest. But nature made that law. Man cannot repeal it.

Really, we have no other choice, either in our individual, our business, or our national life. Is it not better that the weak and incompetent be crowded aside than that we all go down together? Let us be satisfied with laws and regulations and taxes and tariffs that give everyone, every business, every industry, a fair chance in a clean fight to go forward.

In brief, when termination of the war removes the present vital need for a dynamic economy, heaven forbid that government will put well-meaning handcuffs on business or on individuals.

Walter Campbell Retires

On April 30, Walter G. Campbell retired as Commissioner of the Food and Drug Administration. He thus terminated, while still vigorous and in good health, a distinguished public service which has extended over 37 years. His fair and able leadership will long be remembered.

Perhaps most significant in the retirement of Campbell is an emphasis which he personally gives to the constant fight against unprincipled members of industry.

Not all food technologists have agreed with all of the important rulings made by "Food and Drug" during Campbell's administration. But when times of dispute and difference pass, we never look back upon the controversies to find any unfairness, any recrimination or evidence of variation from service of the public as seen from the standpoint of a vigorous official. Almost invariably we have seen clearly the purpose to protect both the public and the honest members of industry.

As the Food and Drug Administration proceeds in its further administrative work, we can hope for no better future than the same fair, honest public service which has been given under the direction of Walter Campbell.

Those of us who know Dr. Paul Dunbar, able successor to Campbell, fully expect a continuance of leadership on this high level.

Help Your Distributors With OPA Facts

Many food distributors have grave difficulty understanding both their rights and their responsibilities under war rules. Washington does not always appear too sympathetic because it is engaged most of the time in dealing with recalcitrant or unreasonable folks. Often it fails to give regional and local firms the help which they should have.

Food manufacturers frequently can be of great aid in such circumstances. Right now there is an opportunity to build good will among distributors by helping on the problems of point adjustments to stimulate sales and avoid spoilage of rationed foodstuffs. This remains important even though rationing is now much curtailed by the generosity of nature and the common sense of OPA in cutting back on rules.

Many distributors would welcome from their suppliers exact information regarding conditions under which they may work. The supplier can give them such information in language more readily understood than the legal mumbo-jumbo in which government lawyers indulge. OPA will furnish the manufacturer with the facts. He can translate these facts into understandable simple information for the distributor.

Executives can well consider whether they may not, by this means, build good will among customers. The main precaution is to be sure that the information furnished is correct, so that it will bring help, not trouble, for the distributor and good will, not ill will, for the manufacturer.

Visitors Not Allowed

One may be privileged to deny visitors to his plant or welcome them as he sees fit. That is the prerogative of ownership, but it also carries a responsibility. As pointed out a

few months ago (FOOD INDUSTRIES, October, 1943, page 53) one such concern unconsciously has created an impression that its inside operations were as filthy as its outdoor operations. This is not, however, the only hazard. A highly imaginative public also wonders what is being concealed.

A few manufacturers are trying to conceal their highly prized technical developments. Some are concealing their lack of attractive interior facilities. And some are concealing a reprehensible lack of essential technical equipment. It's odd how information about the latter deficiency gets around.

There is much more to the foregoing than meets the eye. If the shoe fits, there is, according to tradition, an ensuing step. We believe, however, that all food manufacturing plants should be of such excellence from the viewpoint of sanitation, appearance and equipment that the public should have a standing invitation to come in.

Improving Quality Through Heater Design

Vacuum evaporating equipment could be profitably studied for the purpose of improving the quality of heat-sensitive food materials. The function of vacuum evaporation is to lower the boiling point of liquids. Pull a vacuum in the evaporator so that the absolute pressure is, say, 2.89 lb. per square inch and the temperature of boiling pure water will be 140 deg. F., or at 0.815 lb. per square inch the temperature will be 95 deg. F.

From this theory you normally would surmise that the use of vacuum evaporation would keep the temperature of a heat-sensitive food liquid low enough to prevent any damage to flavor and quality. But in all cases of heat transfer from a surface to a liquid, the surface must be hotter than the liquid or the heat will not flow. And the liquid in contact with the heating surface will reach a temperature very near to that of the hot surface. Agitation by boiling, stirring or convection currents constantly changes the film of liquid in contact with the hot surface, so that the contact is momentary.

In vacuum pans or evaporators, the heating units generally are heated by low-pressure steam. A single-effect evaporator with a jacket pressure of 5 lb. per square inch (gage) would mean a temperature at the heating surface of about 227 deg. F. Suppose that the liquid were milk being concentrated by evaporation. The boiling liquid might have a temperature of 140 deg. F. Yet it really would be exposed to a momentary temperature of 227 deg. F. at the heating surface. Such a temperature is high enough to impart a cooked flavor. Even if the concentrated milk subsequently were dried by the finest spray dryer manufactured, the powder would still have the flavor of cooked milk.

Milk plant operators are aware of the hazards to the cream line if the heating-surface temperature is above 146 deg. F. Long ago. Joseph Allweiler of Wieland Dairy Co. (FOOD INDUSTRIES, October, 1930, page 448) met this problem by a two-stage heating method in which the liquid was heated to 145 deg. F. by a heating medium that was at a temperature of 145½ deg. F. Incredible as it may seem, the system actually worked and has been in successful operation for many years. Application of this principle of keeping down the temperature of the heating surface to a point below the critical temperature of the liquid, which in the case of fluid milk is about 146 deg. F., is something that deserves prolonged study. It is obvious that if a dried milk powder can be produced without having a cooked milk flavor, the market for the powder can be enlarged.

Steam at pressures below atmospheric in the heating units will permit lower temperatures. In building-heating practice, this is known as vapor heating. But it would also be worth while to examine the possibility of using hot water, as it is a good heating medium at low temperatures.

As a target to shoot at, the following conditions for milk evaporation are suggested: temperature of heating surfaces in contact with the milk not higher than 145 deg. F.; vacuum sufficient for the liquid to boil at not over 100 deg. F. This will give a temperature differential adequate for good heat transfer.

The foregoing conditions should produce a concentrated product having normal flavor, and the cream line should not be affected in any way, although this may not be a needed virtue.

The cost of pumping a high vacuum in the evaporator must be considered along with the cost of changes in the equipment to bring about lower temperature heating. Also, the rate of evaporation under the changed conditions must be carefully computed to determine its effect on unit costs.

To those who would object that heat treatment improves the digestibility of milk, it is suggested that there is plenty of capacity for producing cooked evaporated milk for such a market. These proposals are for those who are seeking a way to improve the character of concentrated or spray-dried milks for the purpose of enlarging the potential market.

Ask for Phone Reports

The watchman has a clock which he carries to record his inspections throughout the works. The need for this is too obvious to require debate. Equally obvious is the need for frequent reports during the night to the superintendent's office regarding all continuous operations.

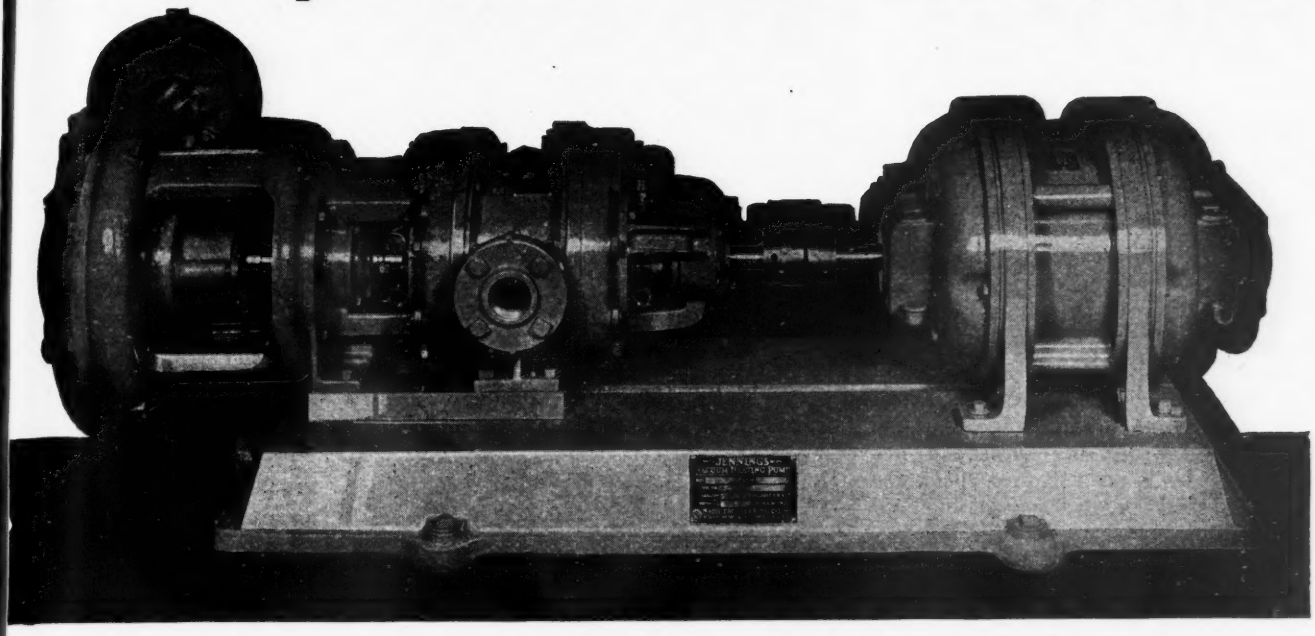
The plant operatives on night duty have a tough time. They are working under somewhat abnormal conditions. They are more apt to be a bit tired than the day or evening shift workers. Their alertness is more subject to question.

One way to know whether men on isolated posts are on the job is to have them regularly call in with a report. They should not be asked merely to telephone to say "I am awake." That offends the worker and defeats the purpose sought. They should be asked to report some particular observation or record of presumed importance.

Even when these facts could be taken off a record sheet the next morning, it is desirable to have them sent in at short intervals during the night. If the operator feels that his continuing attention is demanded, he feels more important. He is stimulated to better work.

A system of night reports carefully worked out does a lot to help both management and workers.

Nash—the Perfected Vacuum Pump for Evaporators and Condensers

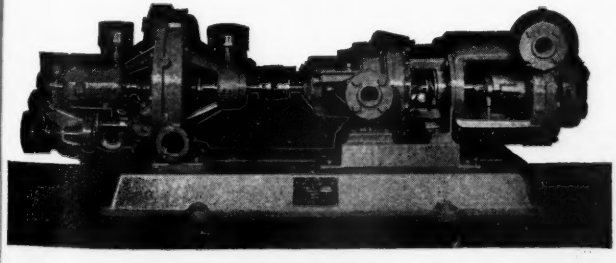


COMBINATION VACUUM REMOVAL UNIT ESPECIALLY DESIGNED FOR SATISFACTORY OPERATION ON CONDENSERS WITHOUT BAROMETRIC LEG

Especially designed for drawing air and liquid from high vacuums, the Nash Vacuum Removal Unit is an efficient combination of a standard Nash Vacuum Pump and a Jennings Centrifugal. This design may be had in either motor or steam turbine drive, and may be installed with confidence that it will operate perfectly.

Nash Vacuum Pumps for Evaporator and Condenser Service offer unusual advantages. Vacuum is non-pulsating, producing uniform operating conditions and assuring a better product. Nash Vacuum Pumps have no valves, gears, pistons, rings, or mechanical complications. The single moving element rotates without metallic contact, and no internal lubrication is required. In standard design these pumps maintain vacuums up to 27" of mercury.

Nash Pumps are compact, and require but a fraction of the space taken by old type equipment. They may be installed where convenient, and they operate at suitable speeds for direct connection to either electric motors or steam turbines. Nash engineers will be glad to recommend proper equipment to exactly meet your particular requirements.



THE NASH VACUUM REMOVAL UNIT MAY BE HAD EQUIPPED WITH STEAM TURBINE DRIVE WHERE THIS TYPE IS PREFERRED

NASH ENGINEERING COMPANY

SOUTH NORWALK · CONNECTICUT, U. S. A.

NEW PACKAGES & PRODUCTS

New Labels Used

GAMSON & ESPOSITO, Astoria, N. Y., for the first time is packing its 1-lb. pure tropical Orange Jelly and Orange Marmalade under its own Exposito label.

The formulas originated in Salta, Argentina, and Gamson & Esposito has made no changes in processing the products for the domestic market. Neither pectin, extract nor artificial coloring is used in the manufacture of either of the products. Besides pure honey, the orange jelly contains oranges, grapefruit, lemons, juices and pure cane sugar. A slice of orange which lies suspended in the jelly lends an attractive effect to the finished product. Exactly the same ingredients are used in processing the marmalade, with one addition. The peels of the orange, grapefruit and lemons are included. A heavy layer of paraffine protects the jelly and marmalade from air and moisture; enameled metal screw caps with hazite liners close the jars.

New Coffee Product

CAFEMELO, a pure coffee extract with added dextrines, maltose and dextrose, is a new product recently developed by G. Washington Coffee Refining Co., Morris Plains, N. J.

G. Washington's new product can be used to make coffee and to flavor ice cream, cakes and puddings. It is distributed in the New England area in two sizes—the 4-oz., 35-cup size and the 12-oz., 100-cup size. Both are packed in glass jars with enameled metal screw caps lined with coarse paperboard and a heavy paper thickly coated with wax. The caps are furnished with an innerseal which is glued to the tops of the jars at the time the cap is screwed on.

Gray Cereal Boxes

KELLOG CO., Battle Creek, Mich., has made a change in its familiar white cartons of Kellog ready-to-eat cereals. Because of the critical wood pulp shortage, a limited quantity of cereals will be packed in gray boxes in cooperation with paper mills supplying orders for the armed forces. The following printed notation appears on the gray package: "This carton a wartime substitute for the regular sparkling white Kellog box. But the contents are the same delicious, oven-crisp cereal that you have always enjoyed."

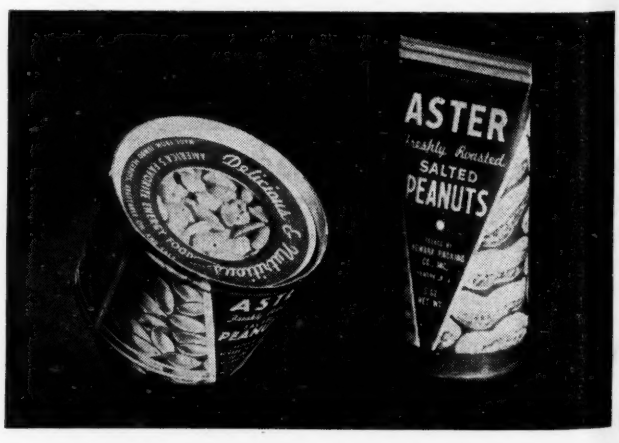
New Peanut Package

IN PACKAGING its Aster salted peanuts, Newark Packing Co., Newark, N. J., uses 5-oz. truncated-cone-shaped containers instead of the 7½-oz. round paper cups with set-in window lids formerly used. American Sealcone Corp., New York, is the fabricator of the new package. It consists of a heavily waxed single thickness of paper with an overlap and is sealed with a thin enameled metal strip at the top. For additional moisture-proofness, the cone is taped with a strip of gum tape along the side. The bottom of the container is inserted and spun on to form a final water and moistureproof seal. The side blank is imprinted or lithographed with the identifying label before forming.

The peanuts pour out easily from the carton, which opens along a dotted line at the top. Simple in design, its size and shape makes for more convenient handling and 24 packages are dovetailed into a case for shipping.

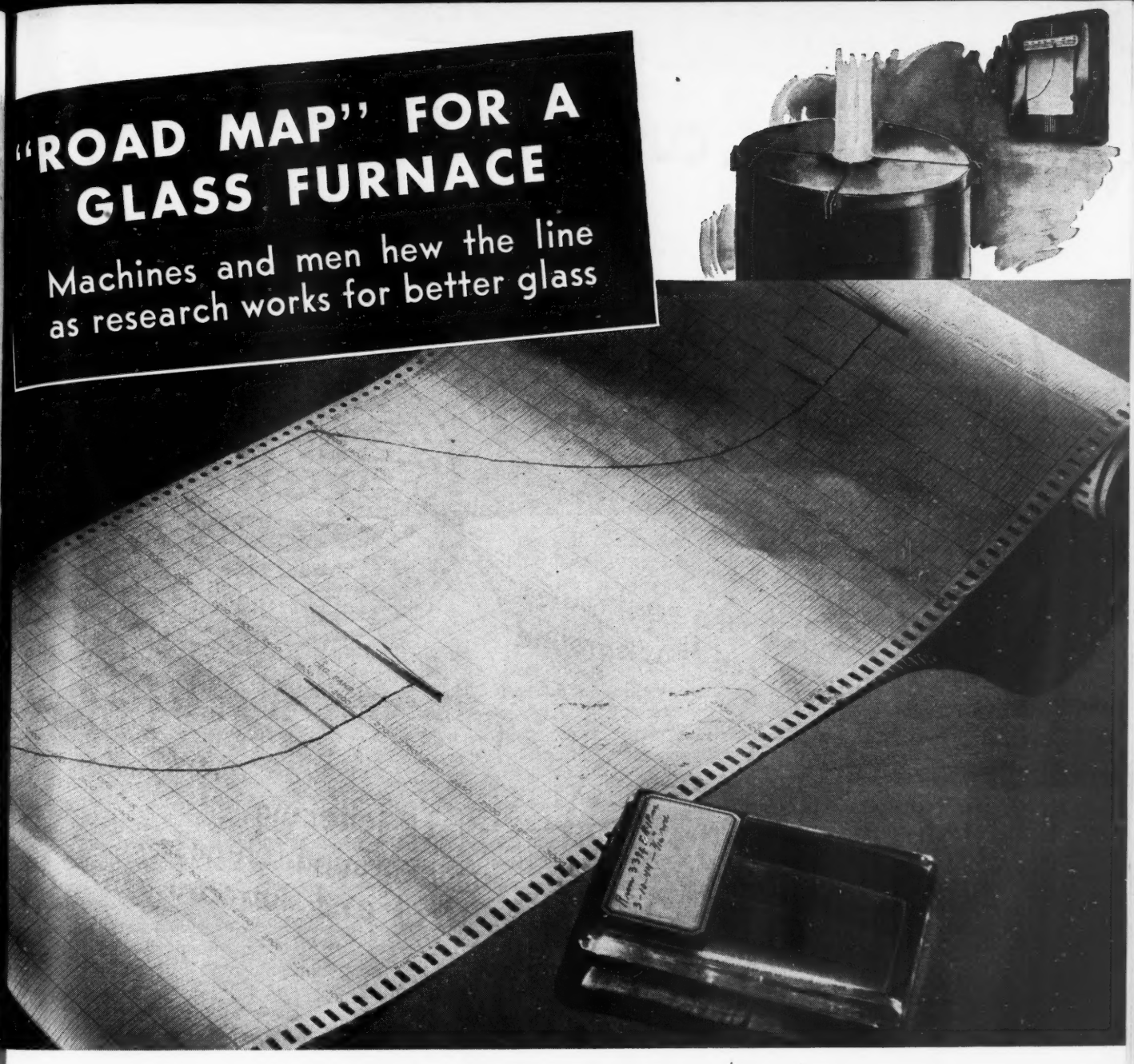
French Mix

EVEN A NOVICE at salad making can prepare a French dressing with a minimum of skill simply by adding vinegar and salad oil to the dry in-



"ROAD MAP" FOR A GLASS FURNACE

Machines and men hew the line as research works for better glass



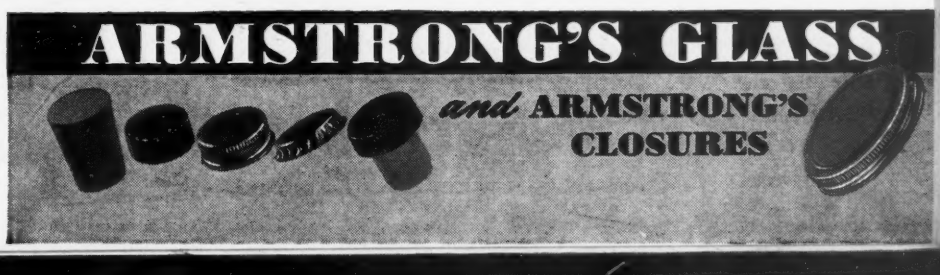
THE temperature in Armstrong's experimental glass furnaces travels a long road . . . and must be at a certain place at a certain time. In the melting of an experimental batch, it rises from room temperature to a predetermined limit—sometimes above 2600° F.

A glass chemist often has a series of "runs" that he wants heated at exactly the same rate. This means that the furnace must retrace identically every step of its 2600-degree journey many times. For the Armstrong chemist, this feat is not so difficult as it sounds. He simply chooses a "road" for the furnace!

This chart indicates where the temperature of the furnace should be every minute of its heating schedule. The chart is placed in the furnace temperature recorder, and the furnace temperature is regulated so that it follows the route exactly. So precisely is its rise controlled that the temperature may be steered over the same path any number of times without varying more than a few degrees from its "itinerary" at any time!

Armstrong's chemists, physicists, and engineers employ many other equally precise controls in their glass laboratories. Their experience and skill, plus the aid of the latest in equipment, have been major factors in establishing and maintaining Armstrong's reputation for top-quality glass.

Many interesting articles about the trained men and women who make fine glass are contained in Armstrong's interesting booklet, "Men and Glass." For your free copy, write Armstrong Cork Company, Glass and Closure Division, 4206 Prince St., Lancaster, Pennsylvania.



WHICH CAP WILL CUSTOMERS SEE FIRST?

It's a sure bet that a cap which carries a colorful, distinctive design will catch a customer's eye faster than a plain one. And thus make extra sales for the packer.

And it's just as certain that a well designed cap will catch more eyes—make more sales—than one that's poorly done.

So it's important that you not only use the large flat surface on your caps, but use it to the best advantage.

And that's where we come in. We specialize in designs for Armstrong's Metal Caps that make your packages stand out in display, help your customers identify them, fix your name firmly in their minds.

Let us show you, free, how we can add this extra sales-appeal to your packages. Drop a note, and a sample of your package, to Armstrong Cork Co., Glass and Closure Div., 4306 Prince St., Lancaster, Pa.

Armstrong's Closures

TURN STANDARD CONTAINERS INTO STANDOUT PACKAGES

gredients found in French Mix. R. W. Knapp, St. Louis, Mo., is the manufacturer of this product which contains mustard, salt, sugar and spices. Although French Mix is not a new product, it only has been on the market in a small way. It is now being distributed in larger quantities by mail.

The dry ingredients are packed in a 1-oz. cellophane envelope, which is inserted in a white kraft envelope stamped with the manufacturer's label, and sealed. The cellophane wrapper is crimp sealed at the bottom, folded over and heat sealed at the top. Four small packages come in a cardboard box.

Twelve ounces of salad oil and 4 oz. of vinegar (lemon juice may be substituted) added to the mix make 1 pt. of French dressing. Worcestershire sauce or chopped pickle may be used to lend variety in the dressing.

Chicken Concentrate

CLEARBROOK FARM, Dundee, Ill., is the manufacturer of a new product—Chicken Concentrate Base. Made from whole chicken meat, salt, celery, spice extractives, onion, hydrolized plant protein, sugar and spice, the chicken concentrate is used to prepare bouillon, consomme, stock, gravies, white sauces and even in meat loaf as an additional seasoning. It also is being used by a number of Red Cross blood donor centers throughout the country as a stimulant to persons donating their blood. A little concentrate goes a long way, so that only 4 level teaspoonfuls is needed to make 1 qt. of bouillon. The 5-oz. size makes from 25 to 40 cups of bouillon.

The base is mustard colored and is ground to a medium fineness. No vegetable oils or other fats have been added, and a strong odor of chicken emanates from the jar when it is opened. Clearbrook Farm is planning to package the base in 15-oz. jars, 5-lb. packages and in 50-lb. tubs for institutional use. The small size has a metal screw cap lined with a paperboard disk.

Fruit Dainties

NUT-TOPPED confections rolled in cereal "shavings" are being packed under the name of Fruit Dainties by Sun Cal Co., Chicago. The distributor of this new fruit candy, which is sold as a bulk item rather than a packaged one, is E. D. Skinner & Co., Inc., Chicago.

Prepared and packed in the Coachella Valley of California, the dainties are made from California date meats, orange peel, malted kernels, sugar, corn sirup, grain cereals, nuts and less than 0.01 percent of sodium benzoate. They have a distinct orange flavor and can be served as a confection or used as centers for coated candies. The ingredients are combined to form a heavy paste, shaped into rolls (1¾ in. by ¾ in.) and rolled in cereal shavings to prevent them from sticking. They are then close packed by layering in 9-lb. wooden boxes lined with a white moisture-resisting paper.

Rossotti is Ready

from Coast to Coast to work out your LABEL REQUIREMENTS

Rossotti labels are engineered to meet the particular requirements of each specific product. They are designed to both attract the eye and sell the product intelligently—stressing the nutritional value as well as the pleasing physical characteristics.

If you are interested in better merchandising—greater acceptance for your products—increased sales—and more repeat business — call in a Rossotti Packaging Sales Engineer. Take advantage of our 46 years of experience in producing labels that sell. We specialize in:—

ROSSOTTI **TRU-VU** VIGNETTES

True color photographic vignettes or pictorials used on our labels, wrappers and cartons.

ROSSOTTI **TRU-ART** VIGNETTES

Drawn art pictorials used on our labels, wrappers and cartons.

For emergency rush orders we also have on hand:—

ROSSOTTI DE LUXE STOCK LABELS AND CARTONS

A complete line of stock labels and cartons for practically every variety of processed foods.

● *Write* or call the Rossotti office nearest you. We will be glad to work with you on your labeling problems at no obligation.

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If you were to look in at any time, on our "Making Vitamins by the Tons," you would see that the process is far more than a matter of mere quantity production.

It is a matter of finest *quality*, unremittingly produced in quantity. That involves many delicate micro-assays and other precision tests—as conducted, for example, in this one of the multiple Roche control laboratories.

In addition to tests described in the U. S. Pharmacopoeia and other guides, are some devised by our own chemists, to whom many years of exclusive experience in vitamin work have revealed important fine points in maintenance of quality control.

See that the vitamins going into your food products come from Roche Park. Technical data and quotations gladly supplied.

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FOOD INDUSTRY NEWS

Easing of Food Rationing Is a Temporary Measure

Tighter meat supply expected while future rationing of vegetables depends upon crop harvest

NEWSPAPER HEADLINES to the contrary, food rationing has been suspended, not discontinued. The official reasons for the abrupt change have been given as the combination of tremendous hog population with a shortage of corn. What is coming to be an annual controversy is now underway over whether we shall have overweight hogs or a sufficient amount of corn to meet the requirements of the corn processing industry.

Immediately following the announcement by OPA Administrator Chester Bowles, a supporting statement was issued by WFA Administrator Marvin Jones in which he hinted that beef also might be removed from rationing. Mr. Jones said in part: "The remarkable job of producing hogs has made it possible to remove pork from rationing temporarily and at the same time have plenty for our armed forces and our fighting Allies. . . . Just now there is no serious food shortage of any kind. We have an abundance of cattle, and as soon as movement into processing plants is sufficient, everyone should be able to have a good supply of beef."

He then warned that a tighter meat supply is to be expected, saying: ". . . There is still not enough feed to supply the number of livestock we now have. It will be necessary to adjust our livestock and poultry numbers to the available feed supplies."

Other motives that have been suggested are (1) political, (2) that it is a punitive move against the black market in meat, and (3), a poor third, that it has been done as a matter of convenience for the general public.

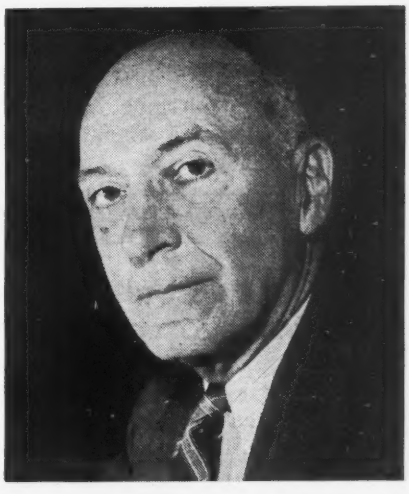
OPA has stressed that the machinery for rationing is retained in standby condition for use whenever needed. Complete rationing of foodstuffs probably will not return until greater supplies of foods are needed to support the military effort overseas and to feed the populations of liberated areas. This, in turn, depends upon the availability of shipping to handle the tremendous supplies that are available. With the pipelines full and shipping space at a premium, supplies are backing up in this country.

Canned vegetables which are now almost 100 percent point free may not have to be rationed again. This probably depends upon the size of commercial packs and what stores can be laid aside by the victory gardeners and home canners.

It is important to note that the dairy products—margarine, creamery butter, farm butter, processed butter, all cheeses and canned milk—are competing with beef steaks and beef roasts for the housewives' red points. The supply of table spreads apparently is still insufficient to permit the removal of all restraints on the buying public.

Although lard and cooking oils have been point free for some time, housewives will continue to receive both ration points and cash for waste kitchen fats. No change is to be expected even though stocks of lard in storage are increasing rapidly. The shortage is in inedibles. Present tremendous stocks of edibles are expected to melt away when shipping permits the requirements of UNRRA to be moved to devastated areas.

DR. PAUL B. DUNBAR



WALTER G. CAMPBELL

Paul Dunbar Becomes Head of the F&DA

POLICIES of the Food and Drug Administration will be unchanged under the new director, Dr. Paul B. Dunbar, who was appointed commissioner May 7. Dr. Dunbar fills the vacancy caused by the retirement of Commissioner Walter G. Campbell. The retiring commissioner had served the government ably for 37 years.

The new commissioner worked with his predecessor for 29 years. "Is it any wonder," said Dr. Dunbar to a FOOD INDUSTRIES representative, "that having been closely associated with Mr. Campbell for nearly a third of a century in this enforcement work and having participated with him in the formulation of the food and drug enforcement policy, there is no disposition on my part to change the enforcement methods worked out under Mr. Campbell's regime."

In 1907 Walter Campbell entered government service as chief Food and Drug inspector. This was when the Food and Drug Act of 1906 went into effect. Under the general direction of Dr. Harvey Wiley, the great crusader, Mr. Campbell organized a small staff of inspectors and developed plans for operation of the inspection service. In 1927 he organized the Food and Drug Administration which he directed until his retirement, being designated as commissioner of Food and Drugs when the organization was transferred from the Department of Agriculture to the Federal Security Agency in 1940.

One of the first acts of the new Food and Drug Commissioner was to announce that Charles W. Crawford, who has been assistant commissioner since 1942, would continue in that position and be second in command.

L. CHARLES MAZZOLA

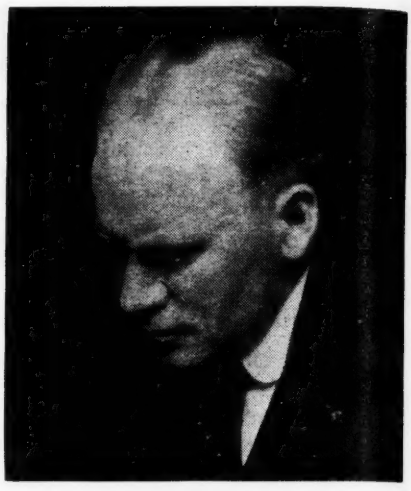
Mazzola Joins Staff Of Food Industries

L. CHARLES MAZZOLA, a food technologist with wide experience in the operating, engineering, distribution and management phases of the food industries, joined the editorial staff of FOOD INDUSTRIES on June 1.

In more than 20 years in the industry, Mr. Mazzola has been, successively, vice-president of J. N. McNiece Co., Inc., New York food brokers; research engineer for Snider Packing Corp., Rochester, N. Y.; general manager and then president of Geneseo Jam Kitchens, Inc., Geneseo, N. Y.; and director and secretary of Ivanhoe Foods, Inc., Auburn, N. Y. In addition to management, his work has included studies of distribution problems and the layout and direction of processing operations.

Since November, 1942, Mr. Mazzola has been with the office of the Quartermaster General, where he headed the food section dealing with renegotiation of war contracts. This work brought him in contact with food manufacturers all over the country.

Mr. Mazzola is a licensed chemical engineer, a charter member of the Institute of Food Technologists, member of the American Institute of Chemical Engineers and past-president of Cooper Chemical Society. He holds several food patents and has applied for one on lye peeling of potatoes and other vegetables. This was described in the January, 1943, issue of FOOD INDUSTRIES.



HEADS IFT MEETING

Dr. W. V. Cruess who, as president of the Institute of Food Technologists, presided at the group's fifth annual meeting at the Edgewater Beach Hotel, Chicago, May 29, 30 and 31. The gathering, which was just getting under way as this issue of "Food Industries" went to press, stressed the most recent developments in food research as well as the many problems relating to our wartime food supply. A report on the proceedings, and the names of new officers, will be published in the July issue of "Food Industries."

THE PROCESSING PICTURE

Food Processors Get Work Promotion Kit

A COMPLETE advertising and promotional kit for recruiting seasonal workers has been prepared for the food processing industry by the War Manpower Commission. The kit includes general suggestions, such as examples of successful mobilization, promotion and speech material, suggested newspaper advertisements, newspaper editorial and publicity material, poster programs and radio material.

The kits will be distributed to food processors, can manufacturers and all local U. S. Employment Service offices and the government suggests that every processor obtain one of them.

New Process Found For Cleaning Peas

A FLOTATION process using a foaming emulsion containing a light oil has been developed for cleaning peas in a cooperative effort by the Department of Agriculture's Bureau of Agricultural and Industrial Chemistry, the Washington Agricultural Experiment Station and canners in Washington and Oregon.

As announced by the Department of Agriculture, this mixture permits the peas to settle to the bottom of the tank where they can be drawn off, while night shade berries, of particular trouble to the producers in the Northwest, and such other undesirables as tarweed seeds and dog-fennel blossoms, as well as a high percentage of cracked peas and loose skins, are floated off. The development is credited to Drs. M. K. Veldhuis and A. M. Neubert of the Bureau of Agricultural and Industrial Chemistry operating in the Pullman, Washington laboratory.

Output Near Quota On Canner Equipment

MORE than 70 percent of the current fiscal year's requirements program for canning machinery has already been completed by manufacturers, according to the Canning Machinery Industry Advisory Committee, with the remainder of scheduled production assured of completion during the next three months, the War Production Board reports.

While no official estimates of the 1945 production program have as yet been presented to canning machinery manufacturers, it is believed that the figure will remain at or about the 110 percent of base period total used to compute the 1944 program.

Balls-Tucker Process Is Not Recommended

TREATMENT of wheat or wheat flour with sodium sulphite as a first step in making industrial alcohol from such grain was proposed last year by Dr. A. K. Balls and Mr. I. W. Tucker of the Bureau of Agricultural and Industrial Chemistry. The industrial possibilities of that proposal have been investigated very carefully by plant-scale studies in nine industrial distilleries making alcohol for the war program. The results are summarized in a recent report of the Office of Production Research and Development which reaches the following negative recommendation:

"At present, OPRD cannot recommend the general commercial use of the Balls-Tucker process throughout the alcohol industry since probable malt savings are counterbalanced by additional equipment requirements, and a probable loss in alcohol production during the period of perfecting process operations."

The six conclusions from the field studies expressed in the same report were:

"1. The enzymes of wheat and granular wheat flour may be activated with sodium sulphite and used to replace part of the barley malt used in starch conversion.

"2. The amount of malt replacement will vary with the wheat used, and therefore will require careful control of process variables for maximum efficiency.

"3. Extra equipment will be required in distilleries using sodium sulphite to replace part of their malt requirements.

"4. With careful control, fermentation efficiencies may be expected to equal those obtained using conventional malting procedures.

"5. The quality of alcohol produced by this procedure should be comparable to that produced by the conventional procedure.

"6. Protein recovery beyond 2½ lb. per bushel cannot be predicted. Since extensive washing and separation equipment and large quantities of water would be required to recover high-grade protein, an essential use other than animal feed must be found for this material to warrant this type of recovery."

Dairy Month Program Set For Special Job

JUNE Dairy Month this year has a special job to do, according to the National Dairy Council. The program is geared to the industry problems of today to (1) establish the essentiality of dairy products and the dairy industry, (2) explain why dairy foods are not always available, and (3) to encourage production of these products. The entire program is being developed as an aid to the industry in coping with wartime problems.

In contrast to the highly specialized sales and promotion campaigns of previous years, plans this year call for stressing the "essentiality" of the industry and its products. The part that dairy products are playing in the wartime period, keeping up the morale and the physical fitness of the fighting forces on the war front, will be especially emphasized. Of almost equal importance is the part played by milk and its products in keeping a nation of war workers physically fit and producing at maximum efficiency.

The necessity of dairy products for the fighting forces, for war workers and in the home will be emphasized in the most extensive publicity program ever planned by the council for June Dairy Month.

New Condensed Milk Uses Now Limited

FOOD AND DRUG Administration recently accorded recognition to "corn sirup condensed milk." But this action does not automatically make this commodity available for use in all classes of manufactured foods. Involved are certain rather technical limitations imposed by the law under which Food and Drug Administration operates. Two examples will illustrate the way this law works.

If a manufactured food may properly contain both corn sirup and evaporated milk, it is expected that such a product could also contain corn sirup condensed milk, since the latter is for

"An Army marches on its belly"

★

Pardon us Napoleon, we'd say on its PACKAGES!

Today, we not only give our fighting men the right kind of food, but we see to it that *protective packaging* insures its wholesomeness right up to the fighting line.

Packaging machinery is meeting this need—not only for food but for many other supplies that require protection.

Were it not for the high-speed production made possible by modern wrapping machines, it would be impossible to turn out the vast quantities required... Our machines, for example, are wrapping rations, gauze bandage, medical supplies, carbine and submachine-gun clips, etc. at speeds of from 75 to 380 packages per minute. And manufacturers have found it possible to use practically *any type of wrapping material* on these machines, thereby permitting the best protective wrap for each product.

When the war is won, the lessons learned in this intensive effort will surely lead to new and improved forms of peacetime packaging. We're storing up ideas as we go along. And we're ready now to study your post-war requirements.

Write or phone our nearest office

PACKAGE MACHINERY COMPANY

Springfield 7, Massachusetts

NEW YORK CHICAGO CLEVELAND LOS ANGELES TORONTO

PACKAGE MACHINERY COMPANY

Over a Quarter Billion Packages per day are wrapped on our Machines

all practical purposes a mixture of evaporated milk and corn sirup. If such a manufactured food is not one for which a standard exists, then the presence of this material in the listing of ingredients on the label would presumably be in accordance with the actual commodity used in manufacture. However, if both corn sirup and evaporated milk were disclosed in the list of ingredients, it presumably would be possible to introduce them in the form of their mixture as corn sirup condensed milk without making an old label improperly in error or deceptive. When a new label is prepared, however, it should state the ingredients in the form in which they are actually used, so far as practical.

When new standards for products are developed, it will now be important for the definition to indicate whether only evaporated milk and sweetened condensed milk, or whether corn sirup condensed milk also is to be recognized as one of the optional ingredients. If it is not so recognized in a new standard, then this new form of condensed milk presumably would not be eligible for use in manufacture of the standardized food, unless the list of recognized ingredients also includes corn sirup as optional.

Food Specifications Issued by Army

THE following food specifications have been issued recently by the Quartermaster Corps. They are listed with the Chicago Quartermaster Depot number and date of issue.

Boneless and Frozen Beef, C. Q. D. 11K, March 24, superseding C. Q. D. 11J. Army Air Forces Combat Lunch, C. Q. D. 156A, March 24, superseding C. Q. D. 156 and amended April 11. Roasted and Salted Peanuts, C. Q. D. 177, March 29. Biscuits and Crackers, C. Q. D. 176, March 31, superseding C. Q. D. 21F, 55B, 84A and 162. English-Style Stew, C. Q. D. 76A, March 31, superseding C. Q. D. 76. Boned and Canned Chicken or Turkey, C. Q. D. 34B, superseding C. Q. D. 34A. Cocoa Beverage Powder, C. Q. D. 57C, superseding C. Q. D. 57B and amended April 29. Dehydrated Apple Nuggets (Crisps), C. Q. D. 78A, April 8, superseding C. Q. D. 78. Ration, Type-D, C. Q. D. 19E, amended April 11 and April 27. "War" Style Lard, C. Q. D. 39A, April 12, superseding C. Q. D. 39. Canned Beef and Gravy, C. Q. D. 151A, April 7, superseding C. Q. D. 151. Canned Pork and Gravy C. Q. D. 150A, April 7, superseding C. Q. D. 150. Dried Milk, Whole and with Non-fat Solids, C. Q. D. 166A, April 8, superseding C. Q. D. 166, to be used in lieu of Federal Spec. C-M-351C. Dehydrated Soups, C. Q. D. 26C, April 20, superseding C. Q. D. 26B. Dehydrated Onions, C. Q. D. 70B, April 29, superseding C. Q. D. 70A. Dehydrated Carrots, C. Q. D. 73B, amended April 30. Dehydrated Hominy, C. Q. D. 139A, May 1, superseding C. Q. D. 139. Frozen Vegetables, C. Q. D. 167A, May 6. Packaging and Packing of Spices, C. Q. D. 178, May 10, superseding Part 111 of OQMC 128.

NEW SPICE TRADE OFFICERS

The officers elected by the American Spice Trade Association at their 38th annual meeting at the Hotel Astor, May 9-10, as shown here are, left to right, F. E. Stillman, of the James H. Forbes Tea and Coffee Co., St. Louis, vice-president; William Archibald, Jr., of Van Norden and Archibald, New York, president; and Harry J. Schlichting, of B. H. Old and Co., New York, treasurer.

DISTRIBUTION

OPA Simplifies Price Regulations in FPR 1

IT IS confidently expected that food processors will suffer fewer headaches in interpreting future OPA regulations, as they apply to their particular products, as a result of the new, simplified Food Products Regulation 1, issued just in time to catch the 1944 pack.

In general, the new regulation does not change pricing methods and in no case does it alter the price. There are some instances in which parts of the regulation, such as definitions, are slightly different because of the standardization to effect simplifications in the wording, organization and presentation.

The regulation consists of one document containing the provisions that apply in general to all processed foods, such as definitions. For each closely related group of foods, such as canned fruits and vegetables, there will be a second and separate document which will establish maximum prices for those products. This short, supplementary second document will be designed to answer most of the questions relating to the pricing of a particular product or group of products. Its purpose, according to OPA, will be to gather into a single document the provisions most commonly used in fixing maximum prices for certain food products in sales by processors, repackers, primary distributors and immediate sellers, but not wholesalers and retailers.

"A" Awards Earned by 24 More Food Plants

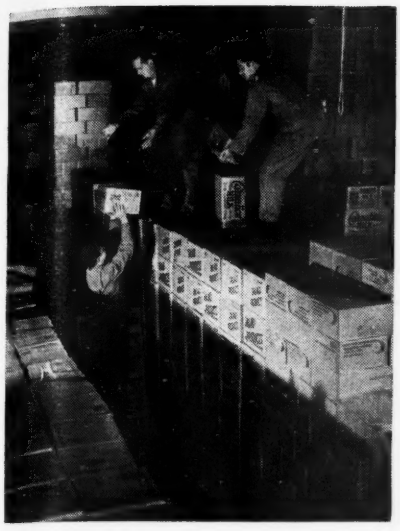
WAR FOOD ADMINISTRATION achievement "A" awards have been earned by 24 more food processing plants.

The plants are: Cranberry Canners, Inc., Hanson, Mass.; H. J. Heinz Co., Salem, N. J.; three plants of E. Pritchard, Inc., the Bank St. and Eagle St. Plants at Bridgeton, N. J., and the plant at Winslow, N. J.; Fuhremann Canning Co., Lanark; Roberts & Oake, Inc., Chicago; Drummond Packing Co., Eau Claire, Wis.; Fox Valley Canning Co., Hortonville, Wis.; Hyland Stanford Corp., Los Angeles, Calif.; Winter Garden Co., Knoxville, Tenn.; Hungerford Packing Co., Hungerford, Pa.; G. S. Suppiger Co., Belleville, Ill.; Emge and Sons, Fort Branch, Ind.; Nestle's Milk Products, Inc., Marysville, Ohio; Pratt-Low Preserving Co., Santa Clara, Calif.; Walti Schilling & Co., Inc., Santa Cruz, Calif.; Bozeman Canning Co., Bozeman, Mont.; and the following companies in Florida: Adams Packing Association, Auburndale; Bordo Products Co., Inc., Winter Haven; Floridagold Citrus Corp., Lake Alfred; Lakeland Highlands Canning Co., Highland City; Pasco Packing Association, Dade City; and Polk Co., Haines City and Tampa.

WFA Releases Foods For Civilian Use

FOLLOWING its recently announced policy, WFA has released quantities of canned foods by first offering them to the packers from whom they originally were purchased. These goods were in actual government possession, but their commercial labels had been retained.

The foods released for civilian use because of altered war requirements are: 391,124 cases of No. 2 cans of



AIR FORCE SUPPLIES

Warehousemen at an Army Air Force base handle an average of 55,000 cans of milk each month in addition to 70,000 qt. of fresh milk and other food supplies.

canned corn; approximately 28,000 cases of No. 2 cans, 26,000 cases of No. 3 cans and 18,000 cases of No. 10 cans of single-strength orange juice; around 125,000 cases, mostly No. 2½ cans and some No. 10 cans, of pumpkin; and about 90,000 cases, 6 No. 10 cans to the case, of sauerkraut.

Foreign Trade Studies Planned for Foods

COMPREHENSIVE INQUIRIES are being planned by the U. S. Tariff Commission for the guidance of Congress in future tariff making and drafting of international trade restrictions. A wide variety of commodities is being surveyed, among them the following of interest to food companies:

Starches, oils and fats and their raw materials, cattle and beef, dehydrated vegetables, dried and evaporated milk, butter, cheese, edible nuts, and probably other commodities that are important in the trade of the United States with the rest of the world.

Representatives of any firm or trade group desiring to keep in touch with this program should communicate with the U. S. Tariff Commission through its Washington, D. C., offices.

Agricultural Markets Probe Opens In June

THE special committee of the House Agricultural Committee, appointed to investigate agricultural marketing, has invited a representative group of government and trade agencies to designate members of an advisory committee to help with the long-awaited Congressional investigation. The com-

Mechanical Force for the Control of Flour Mill Insects

A Full 100% Kill

Mechanical Treatment Destroys Insects in Foods

How Millers Are Waging

WAR ON INFESTATION

• *Above are typical news headlines which have appeared in connection with reports on the "ENTOLETER" and its destruction of all forms of insect life in flour mills and food plants.*

Good News *is Being Made By*

ENTOLETER
INFESTATION DESTROYER
REG. U. S. PAT. OFF.

"ENTOLETER" shown above handles 15,000 lbs. per hour. Others available to handle 2,000 5,000 or 10,000 lbs. per hour.

What do users say about "ENTOLETER" performance in their mills after months of experience? What have exhaustive, independent tests of "ENTOLETER" efficiency proved? The answers are the facts that have made "ENTOLETER" *good news* for food processors everywhere.

The "ENTOLETER" is the new, positive method of insect control. It completely *destroys* all insect eggs and *other forms of insect infestation* and is a simple, *continuous* method of controlling infestation in flour, meal and similar free-flowing dry materials.

"ENTOLETERS" are in service in plants where these food products are manufactured: Soft Wheat Flour; Hard Wheat Flour; Durum Flour; Soya Flour; Cake Flour; Graham Flour; Pancake Flour and Ingredients; Corn Flour; and Whole Wheat Flour; also for Soya Grits; Soya Meal; Semolina; Powdered Soups; Cereals; Corn Meal; Farina; Brewers Grits; Brewers' Yeast; Wheat Germ; Muffin Mixes and various other mixes. Write to us for free reports of independent tests. ENTOLETER DIVISION, The Safety Car Heating & Lighting Company, Inc., 230 Park Avenue, New York 17, N. Y.

ENTOLETER
INFESTATION DESTROYER
REG. U. S. PAT. OFF.

CONTINUOUS DESTRUCTION OF ALL INSECT LIFE

mittee is expected to meet with the Congressional probers early in June when a definite course for the inquiry will be worked out.

Representative Flannagan, of Virginia, chairman of the investigating committee, estimates that the inquiry may take three years. He emphasized that a sincere effort was to be made to get at the facts of agricultural markets and the reasons for the unusually large spreads between farmer and consumer in some commodities.

Food Demand Still Up

NOT ONLY is the demand for farm products continuing at the very high level established late in 1943, but consumer incomes are more than sufficient to buy all such products available this year for civilian use at current stabilized prices. This is the conclusion of the Department of Agriculture in face of the fact that there are temporary surpluses of a few products such as potatoes and eggs.

RAW MATERIALS REVIEW

Short Wheat Supply Is Seen By Millers

A RESOLUTAON protesting the use of wheat for other than human food was adopted by the Millers National Federation at their 42nd annual convention, at the Edgewater Beach Hotel, Chicago, May 4 and 5. Because the wheat supply has become so critical, the Federation further resolved that only low quality and definitely surplus wheat should be used for animal feeding and alcohol making.

C. R. Yager, vice-president, Ballard & Ballard Co., Inc., representing soft wheat millers, reported no visible carryover of the 1943 crop although estimates indicate 30,000,000 bu. of soft wheat still on the farms.

E. H. Leonard, president of Preston-Shaffer Milling Co., representing Pacific Coast millers, reported crop conditions unusually good for a fourth successive abundant crop with harvest three months away. Of the estimated 90,000,000 bu. for 1944, soft wheat will likely constitute 50 percent.

M. F. Mulroy, vice-president, Russell-Miller Milling Co., representing spring wheat millers, reported a potential 200,000,000 bu. maximum crop for 1944 in comparison with crops of 268,000,000 bu. for 1941; 292,000,000 bu. for 1942; and 279,000,000 bu. for 1943. Rainfall thus far in 1944 is only about 60 percent of that for the same period in 1943.

T. A. O'Sullivan, vice-president, Flour Mills of America, representing hard winter wheat millers, reported less than 4,000,000 bu. of free-market wheat in the hard winter wheat area. April 1 estimates put the 1944 crop at 308,000,000 bu.

Richard Uhlmann, president, Uhlmann Grain Co., Chicago, Ill., summarized the normal annual wheat disappearance to be 479,000,000 bu. for milling, 81,000,000 bu. for seed, and 117,000,000 bu for feeding. Wheat disappearance for the 1943-44 crop year is 540,000,000 bu. for milling, 81,000,000 bu. for seed, 110,000,000 bu. for alcohol production and 470,000,000 bu. for feeding, making a total of 1,200,000,000 bu., which is 100,000,000 bu. more than the estimated 1944 crop plus carryover from 1943. Estimates indicate that about 217,000,000 bu. of 1943 crop is still on the farms. Heavy movement to market is expected as 1944 crop matures which will begin in Oklahoma and Texas about June 5.

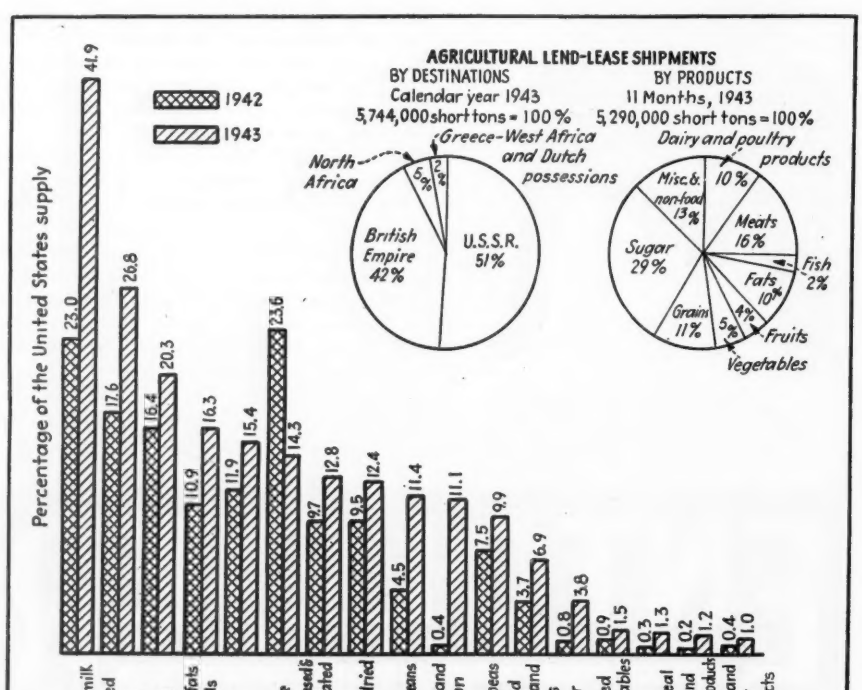
Estimates place 1944 carryover for the four surplus wheat producing countries of the world at 1,250,000,000 bu., as compared with 1,750,000,000 bu. carryover from 1943 crop which makes available some 820,000,000 bu. of exportable wheat in the surplus wheat countries without counting the 1944 crop.

Supplies of flour shipping containers for 1944 were reviewed by Homer V. Howes of Bemis Bros. Bag Co. to be adequate but tight and even short in some sizes during the three to six months in 1944.

With a look towards the future, the retiring president, W. C. Helm of Russell-Miller Milling Co., announced the appointment of a postwar planning committee under the chairmanship of Harry A. Bullis, president of General Mills, Inc.

Review of export market conditions for postwar business reveals a negligible export market for U. S. mills because of the preponderance of exportable wheat from such surplus countries as Argentina, Canada and Russia, as well as self-supporting development of agriculture in countries that were formerly importers of flour and wheat.

Manpower was pointed out as the No. 1 problem for postwar, as it is at present, and recommendation was made for the support of training programs for operating millers in technical schools.



Acreage up for Five Of Seven Food Crops

ACREAGE ESTIMATES by the Department of Agriculture for seven food commodities grown for processing indicate increased production for five and less production for two. The estimates follow:

Green lima bean acreage is expected to be about 7 percent higher this year than last. The crop will total 73,680 acres, against 68,620 acres planted in 1943 and a ten-year average of 44,960 acres.

Sweet corn planting is indicated at 559,150 acres, compared with 550,810 acres last year and an average of 378,-138 acres for the preceding ten-year period.

Snap bean acreage will be about 4 percent less than last year, reports indicate, and is expected to total 167,820 acres, against 174,600 acres in 1943 and a ten-year average of 69,980 acres.

Cucumbers for pickles will be grown this year on 102,120 acres, up somewhat from the 96,460-acre planning in 1943. The ten-year average is 96,360 acres.

Tomatoes will be planted on 627,-060 acres this year, about 4 percent higher than last year. The ten-year average acreage is 449,400 acres.

Pimeinto plantings in California and Georgia this year are estimated at 10,240 acres. This is about 7 percent below the 10,990 acres in 1943 and 30 percent less than the ten-year average of 14,520 acres.

Beets will be planted on 19,670 acres this year, up 3 percent from last year and 69 percent higher than the ten-year average.

Ion Exchange Resins Recover Tartrates

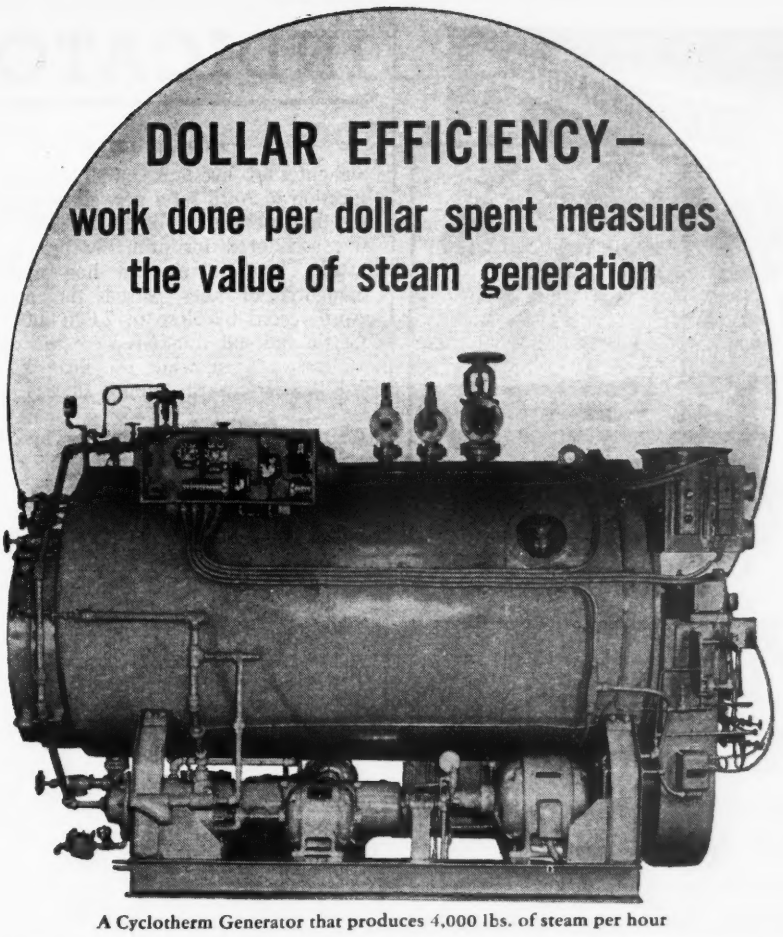
RECOVERY of 85 percent of the tartrates formerly lost in the treatment of grape winery waste liquor, through the use of new synthetic anion exchange resins, is announced by the Department of Agriculture.

Recovery of these tartrates, which are used in the manufacture of beverages and baking powder, can be accomplished at a chemical cost of less than 4 cents per pound and at the rate of almost 5 lb. of acid per cubic foot of exchange material, according to experiments carried out at the Western Regional Research Laboratories. As many as 150 successive exchange cycles were carried out with these resins without detracting from their operating efficiency, the announcement declared.

SCHEDULE OF EVENTS

JUNE

1–30—National Dairy Month.
4– 7—National Association of Retail Grocers, 46th annual convention, Palmer House, Chicago.
5– 7—American Society of Refrigerating Engineers, 31st spring meeting, William Penn Hotel, Pittsburgh, Pa.
5– 7—Canadian Chemical Conference, 27th annual meeting, Royal York Hotel, Toronto, Ont., Canada.
6– 8—National Confectioners Association, war conference, Hotel Waldorf-Astoria, New York.
15—National Pickle Packers Association, mid-year meeting, Hotel Stevens, Chicago.
18–21—Super Market Institute, annual meeting, Hotel Sherman, Chicago.
21–23—American Dairy Science Association, Ohio State University, Columbus, O.



A Cyclotherm Generator that produces 4,000 lbs. of steam per hour

Hundreds of Cyclotherm Steam Generators in a wide range of horsepower have proved they can "take it" and deliver under all kinds of wartime conditions.

The Cyclotherm steam generator shown here, built for the United States Navy, is ruggedly constructed for heavy duty purposes. This unit is fired with Bunker C oil and produces 4000 pounds of steam per hour.

All Cyclotherms are fully automatic, completely self-contained and adaptable to processing, power or heat. The wide use of these generators has proved their unusual steam producing capacity per unit of fuel consumed. Cyclotherm's exclusive principles of combustion and design insure high efficiency at low operating costs.

Cyclotherms may be operated for years with a minimum of attention for they are designed and built to deliver efficient, trouble-free automatic service under exacting conditions.

They are manufactured in units from 10 to 300 horsepower, oil or gas fired. Deliveries are being made as rapidly as the press of Government orders permit. While the range of available units obviously cannot be on a peacetime basis, if you are planning immediate replacement, our engineers will be glad to cooperate in meeting your needs. We shall be happy to supply any additional information you may desire.

CYCLOTHERM
STEAM GENERATOR

AMES IRON WORKS
OSWEGO . . NEW YORK . . BOX 301

The

COCKROACH

The cockroach is a restless traveler—pulling out at night and often migrating far and fast. He takes his filthy, thieving habits into homes, groceries, restaurants, flour and feed mills, ships and other places where foodstuffs are handled and stored. He pollutes even more than he destroys.

FUMIGATE

Properly applied HCN gas is an effective fumigant for control of this and other insect and animal pests. Call on your local Pest Control Operator for a well planned fumigation program.

We have a book containing interesting information about pests and their control by fumigation. Just drop us a line on your letterhead and we will be glad to send you a copy. E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Department, Wilmington, Delaware.

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AN ECONOMICAL SOURCE
OF HCN FUMIGATING GAS

INDICATORS

Production

Slaughter of livestock under Federal inspection in April set a new all-time record for that month, totaling 9,161,767. This was accounted for primarily by the unusually large increase in hog numbers. Slaughter of hogs passed the previous April record by close to 2,000,000 head. Cattle and calf numbers were the second largest for April, while the sheep kill was the lightest for the month since 1940.

Creamery butter production during March was estimated at 123,300,000 lb., 12 percent less than the March, 1943, output, and nearly 6 percent below the 10-year (1933–1942) March average production.

American cheese production in March was estimated at 57,300,000 lb., representing a seasonal increase of 25 percent compared with the February output of 45,766,000 lb., and being 46 percent over the ten-year (1933–42) March average. The production, however, is 1 percent lower than in March last year.

Canned oyster production last year totaled 214,855 standard cases, against a 1942 pack of 277,098 cases.

Green bean production in canneries last year totaled 18,716,546 cases, as compared with a 1942 pack of 19,624,602 cases. Of the total, 3,712,292 cases was packed in Maryland and Delaware last year and 2,012,261 cases in Oregon.

Wax bean output in canneries during 1943 totaled 2,150,062 cases, or a little more than the 2,057,239-case pack of 1942. Among the various states, New York had the largest pack, with 629,040 cases.

Flour production during April showed a decrease of almost 1,500,000 sacks as compared with the March output, according to figures compiled by *The Northwestern Miller*. The April output totaled 12,682,221 sacks, representing 73 percent of the total production in the United States. A year ago, with 65 percent of the nation's output reported, the figure was 12,535,571 sacks in April.

Evaporated milk production, case goods, showed a sharp seasonal increase in March as compared with the February output, and was the second largest March production on record, being exceeded only in 1942. Estimated at 257,750,000 lb., the March output was 27 percent larger than that of February and 21 percent above the five-year (1938–42) March average.

Condensed whole milk production (bulk goods) was estimated at 8,444,000 lb. for March, 5 percent larger than in March of 1943, but 7 percent under the five-year March average.

Dried skimmed milk produced in March for human consumption is estimated at 47,750,000 lb., the largest on record for that month. Of this quantity, an estimated 21,500,000 lb. was produced by the spray process and 26,250,000 lb. by the roller process.

In Storage

Frozen fruits in cold storage on April 1 amounted to 161,221,000 lb., as compared with 124,392,000 lb. a year ago and a five-year April 1 average of 104,928,000 lb.

Frozen vegetables in cold storage on April 1 amounted to 129,767,000 lb., considerably up from the 70,478,000-lb. figure for last April 1, and more than twice the five-year April 1 average of 58,995,000 lb.

Fresh fruits in cold storage on April 1 totaled 101,000 bu., only two-fifths as much as on April 1, 1943, and less than half the five-year April 1 average of 227,000 bu.

Creamery butter in cold storage warehouses amounted to 82,038,000 lb. on April 1. This compares with 107,560,000 lb. a month earlier and 16,676,000 lb. a year ago. The five-year average is 31,698,000 lb.

American cheese in cold storage had dropped to 121,672,000 lb. on April 1 from 144,812,000 lb. a month earlier, but was almost twice the 64,890,000-lb. figure of April 1, 1943, and much above the 91,777,000-lb. five-year average for the date.

Shell eggs in cold storage on April 1 totaled 4,416,000 cases, more than twice the 2,008,000-case figure for March 1. A year

CHANGE OF ADDRESS

McGRAW-HILL PUBLISHING COMPANY
330 West 42nd Street, New York 18, N. Y.
Director of Circulation:
Please change my address on "Food Industries"

From .....

.....

To .....

.....

Signed .....

CONSTRUCTION NEWS

	Pending (thousands)	Awarded May (thousands)	Total Awarded 1944 (thousands)
Bakery	$120	$40	$120
Beverages	90	.....	.....
Canning and Preserving	134	.....	40
Cold Storage	124	305	831
Confectionery	40	.....	50
Grain Mill Products	.....	120	530
Ice Manufactured	340	.....	40
Meats and Meat Products	.....	.....	318
Milk Products	435	.....	773
Miscellaneous	.....	.....	450
	$1,283	$465	$3,152

ago the holdings were 3,181,000 cases and the five-year average amounts to 1,606,000 cases.

Frozen eggs held in cold storage on April 1 totaled 148,420,000 lb., half again as much as on March 1, when the figure was 98,597,000 lb. On April 1, 1943, the figure was 99,180,000, and the five-year average is 74,934,000 lb.

Frozen poultry in refrigerated warehouses amounted to 168,036,000 lb. on April 1, down considerably from the 220,863,000-lb. figure for March 1. But the holdings were almost three times those of April 1 a year ago, when the figure was 58,079,000 lb. The five-year average is 106,218,000 lb.

Frozen and cured meats in storage dropped 9,300,000 lb. during March. Holdings of frozen and cured beef were increased by 16,700,000 lb., but this was more than offset by reductions of 7,500,000 lb. of frozen and cured pork, 10,600,000 lb. of frozen lamb and mutton and 7,900,000 lb. of trimmings and offal.

Sugar stocks are nearly 600,000 tons smaller now than they were a year ago, despite increased entries from off-shore areas, the WFA reports. Officials indicate that there is little prospect that rationing of this food can be lifted in the near future.

Wheat stocks in interior mills, elevators and warehouses of the United States on April 1 were estimated at 66,759,000 bu. This figure is lower than in any year since the 1935–37 drought period. It is but little more than one-third of the record stocks of 181,099,000 bu. on April 1, 1942, and the 176,591,000 bu. a year ago.

Indexes

Business activity index of *Business Week* stood at 240.3 on May 11, up slightly from 240.2 a month ago and higher than 233.0 figure of a year ago.

Wholesale commodity price index for foods, compiled by Irving Fisher, was 121.6 on May 12, compared with 120.8 a month earlier and 123.1 a year ago.

Cost of living index of National Industrial Conference Board was 104.1 in April, up slightly from 103.4 in March and almost the same as the 104.0 figure a year ago.

Look Into Everything ROLLER CONVEYORS Can Do . . . Ask STANDARD CONVEYOR

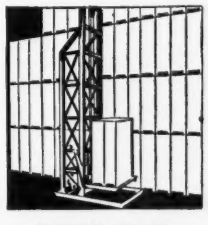
THE steps you take now — the investment in equipment that you may make to cut handling costs will not only pay dividends immediately but can be expected to yield equal or even greater returns in postwar days to come, when handling and other unproductive costs will be under the closest scrutiny.

For example, roller conveyors installed now will be useful in many ways no matter what you may be making or handling when peacetime is here. Roller conveyors are unequalled in low first cost, flexibility and minimum operating expense. They handle a wide range of commodities —parts, packages, units, cartons, cans, bottles, barrels, bundles, drums, boxes. They are available in light, average, or heavy-duty types for either portable or stationary use — in a wide variety of sizes, styles and lengths. Roller conveyors are built in their entirety by Standard, including the vital bearings which are manufactured to the highest standards.

Besides roller, Standard builds belt, chain, slat, and push-bar conveyors, also spiral chutes, tiering and lifting machines, portable pilers, and pneumatic tube systems.

On any conveyor requirement Standard Conveyor is equipped by experience and facilities to recommend and furnish the right type of equipment.

STANDARD CONVEYOR CO.
General Offices: North St. Paul, Minn.
Sales and Service in Principal Cities


TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

TAKE A GOOD LOOK
HIGH TEST CAST IRON UNIT
ONE PIECE CONSTRUCTION
NOTHING TO BECOME LOOSE
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YOU'LL SEE WHY GRID UNIT HEATERS Outlast other types of HEATING EQUIPMENT

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OPA Price Regulations

Powdered Skim Milk—Manufacturers of powdered skim milk—or powdered nonfat dry milk solids, as it is now designated—who are authorized receivers may add ⅜ cents per pound to their maximum prices for sales of car-lot quantities to any government agency as stipulated by Amendment 32 to MPR 289, effective May 1.

Foods for Research—The district offices of the OPA may now grant rationed foods to those engaged in food and nutrition research who had no need for such foods during the 1942 base period. The change is accomplished by Amendment 27 to RRO 13, Amendment 130 to RO 16 and Amendment 12 to RRO 3—all effective April 29. Previously these researchers had to apply to Washington.

Pickles and Certain Packed Foods—Secondary packers of pickles and certain pickled products, maraschino and glacé cherries, Concord grape juice and sauerkraut may add to their March, 1942, ceiling prices increases that have been permitted to their suppliers' maximum prices. The change embodied in Amendment 28 to MPR 306 and Amendment 3 to MPR 488, effective April 26, does not affect the overall retail price of these commodities.

Glass Containers—Dollars-and-cents manufacturers ceiling prices for additional sizes of wide-mouth glass containers are established by Amendment 5 to MPR 382, effective April 24. A price list is thus provided that matches the specifications of standard glass containers listed in the revised WPB order L-103.

Malted Milk—Increases necessary to maintain undiminished production of low-priced brands of malted milk are allowed in the maximum prices of those brands according to Amendment 44 to MPR 280, effective April 13. The increases may be granted where the maximum price is below the general price level of other manufacturers or processors, where the price imposes such a degree of hardship that continued production is threatened and where the loss of the product will result in the consumer having to pay higher prices for the product of other manufacturers or processors.

Tires—Certain sizes of new tires, as well as used tires, are made available to operators of small essential delivery trucks, and used tires are made available for all small trucks and commercial vehicles by Amendment 73 to RO 1A, effective April 21. Ration certificates must still be obtained, however, before any truck tire may be bought.

Processed Foods—The processed foods inventory factor for the reporting period beginning June 4 and ending July 1 will be 3, according to Amendment 12 to Second Revised Supplement 1 to RRO 13, effective May 12. Thus, the maximum allowable inventory for the period can be obtained by adding together the point sales and transfers of the wholesaler during the February, March and April periods and dividing by 3 to obtain the average. This is then multiplied by the factor to get the wholesaler's maximum allowable inventory.

Packed Pineapple—Cuban and Mexican packed pineapple is made subject to dollars-and-cents maximum prices at places of entry into this country by Amendment 126 to Revised Supplementary Regulation 14 to the General MPR, effective April 29. The new prices mean substantial reductions in the abnormally high price foreign sellers are now charging. The amendment does not effect contracts existing before the effective date.

Evaporated Milk Cans—Ceiling prices covering cans for evaporated milk in the 6 and 14½ oz. sizes are increased 8 and 6 percent respectively by Amendment 2 to MPR 350, effective May 15. The increase is expected to be absorbed by the producers and does not affect those producers who manufacture their own cans.

Sugar—Allotment of sugar to 12 classes of industrial users, for the second 1944 quarter, was restored to 80 percent of use during the corresponding month in 1941 by Amendment 19 to RRO 3, effective May 22. A previous order had reduced the amount for these industrial users, except bakeries, to 70 percent, but improved shipping permitted the restoration.

WFA Orders

Bread Enrichment—The vitamins and minerals normally present in all ingredients of white bread may be counted in meeting the enrichment requirements of War Food Order 1 (formerly FDO 1), according to Amendment 1 to that order, effective May 1. The enrichment requirements for white bread also apply to white rolls, effective May 1, but not to yeast-raised sweet rolls and doughnuts.

Fluid Milk—Because of a heavier than usual production of milk during May and June, quotas limiting sales of fluid cream and fluid milk byproducts are adjusted by setting them at 100 percent of the amount sold in June, 1943. As quotas for these commodities are transferrable to fluid milk in most cases, dealers may distribute their increased allotment in fluid milk, cream or byproducts according to local demand.

Butter—War Food Order 2.1 calls for the reservation of 50 percent of June butter for direct war uses. This, added to the 40 percent reservation for May, carries out the WFA plan of reserving a large portion of the total annual supply during the peak-production months. The reservation for 1944 amounts to about 20 percent of the total annual U. S. production.

Ice Cream—Following the practice inaugurated last year, ice cream manufac-

turers will be permitted to exceed their quotas on milk solids during June as well as May, provided a compensatory reduction is made in the use of milk solids during succeeding months. Under FDO 8, only 65 percent of the milk solids used during the base period is permitted for use in frozen dairy foods.

Dried Skim Milk—The set-aside percentage on roller-dried skim milk is reduced from 75 to 50 percent by an amendment to FDO 54, effective May 1. Manufacturers of spray process dried skim milk, however, will continue to be required to set aside 75 percent of their monthly production for war uses.

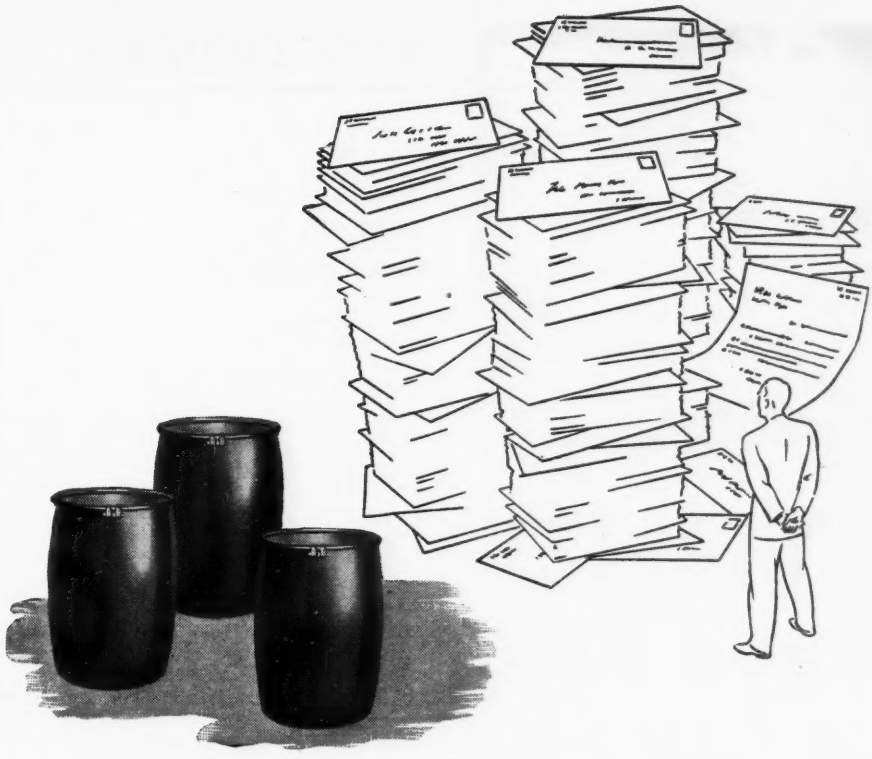
Onions—War Food Order 77, controlling onion shipments, was terminated, effective April 26. With prospective supplies of early crop onions the largest in history, this order which assisted dehydrators to obtain their requirements no longer is necessary.

Hen Turkeys—WFO 97 calls for the set-aside of 100 percent of the hen turkeys processed in Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, Oklahoma, Texas, Washington, Oregon, California, Illinois, Utah, Colorado and Rockingham County, Va. The Quartermaster Corps thus expects to obtain about 8,800,000 lb. of hen turkeys for the holiday dinners of the armed services. This amount represents about half the total that will be needed for the purpose. The remainder will be obtained by another order when birds hatched in 1944 are ready to be marketed.

Cheddar Cheese—Manufacturers of cheddar cheese are required to set aside 60 percent of their output during May and June by WFO 15.7. While this is the highest percentage required this year, it is expected that the greater production during these two months will leave more for civilians than at any time since last July. For the April–June quarter, 121,000,000 lb. has been allocated to civilians, as compared with 90,000,000 lb. allocated during previous quarters.

Beef—The percentage of beef that packers are required to set aside under WFO 75.2 —formerly FDO 75.2—was reduced from 40 to 35 percent by an amendment to the order, effective May 15. This amendment stipulates "Choice," "Good," "Commercial" and "Utility" steer and heifer beef processed by slaughterers subject to the order.

Spinach—Support prices for spinach, cut above the crown, were announced by WFA on May 3. The prices are expected to assure farmers a fair return while canners will be encouraged to start operations immediately, particularly in Virginia, Maryland, New Jersey and Pennsylvania, where supplies are abundant. The prices range from $32 per ton in Wisconsin, Illinois and Indiana to $100 per ton, cut above the crown, trimmed and delivered to Baltimore city canners from Maryland, Virginia, Delaware, New Jersey and Pennsylvania, except designated northern counties.



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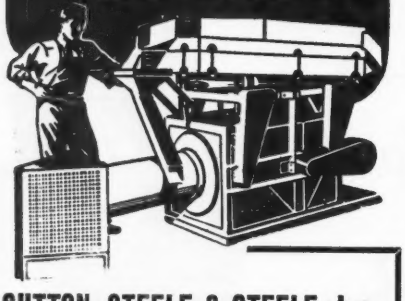

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WPB ORDERS

Wooden Containers—Several changes governing the use of new wooden shipping containers appear in an amendment to L-232, issued April 26. They include postponing from April 1 to July 1 the date on which percentage restrictions on containers for melons and vegetables go into effect. The crops which are restricted as to the percentage of new wooden containers permitted are cantaloupes, mellons, carrots, cauliflower, celery, cucumbers, grapes, lettuce and radishes. The permitted container quotas may be figured on an annual instead of a quarterly basis, and the containers may be used interchangeably among the restricted crops, except for specified types of grapes. No new wooden shipping containers for these crops may be sold or delivered without a certificate from the purchaser. New containers are also permitted for ground mace, ground cloves and ground nutmeg.

Fiber Containers—Purchasers are directed to cancel or postpone any fiber container orders that may not be received within inventory limitations by Direction 1 to L-317. The direction clarifies regulations that pertain to inventory or excessive ordering included in L-317 and PR 1.

Container Machinery—Leased container machinery equipment requiring factory rebuilding or reconditioning may be exchanged for new, reconditioned or rebuilt units of the same size and type without the necessity of first obtaining a preference rating order, according to an amendment to L-332. The amendment also sanctions the transfer of container machinery within a plant or a single corporate enterprise or between majority owned subsidiaries or branches.

Refrigerating Machinery—An amendment to L-38, issued May 10, permits delivery of new refrigerating systems and parts to essential users holding an approved order rated AA-5 or higher. In some cases the purchaser is allowed to apply his rating without special authorization, but in others he must apply to WPB for approval. The order also stipulates how much a manufacturer may produce during any calendar quarter.

Chromium and Nickel—L-134, which restricted the use of chromium and nickel or any alloy of these materials in the manufacture of industrial instruments, control valves and regulators was revoked by WPB, effective May 3. While chromium and nickel have not become freely available, the alloys with which these materials are normally combined, and which were conserved by the order, are not now in tight supply. The use of nickel is still controlled by M-6-b.

CAPITAL VIEWS

USE YOUR COMMITTEE—Most food manufacturing industries are represented in Washington at both O.P.A. and War Food Administration by advisory committees. Such Industry Committee service is intended to bring the best judgment of the industry to the Capital for the benefit of government officials. Individual food manufacturers should tell their troubles to the committeemen who speak for their groups. The committeeman then can really represent his industry adequately.

PLENTY OF NITROGEN—Food manufacturers interested in quality and quantity of crops for processing can tell their suppliers that this year there is an abundance of nitrogen and almost as much potash as they can possibly use. Any farm group that cannot bring in good quality of products for factory use cannot blame their deficiencies on the shortage of fertilizer. This fact might well be made known generally in the farm areas. It might help to get rid of at least one such alibi.

TRAINING COURSES—Many industry groups and certain individual companies have had to set up new plans for training essential workers. For example, the railways of the country have recently established training work for firemen, brakemen, switchmen and other semiskilled employees. There has been less of this training in the food business than there might be. A superior class of workers is attracted if they know they are trained for the job and that they are correspondingly well paid when they make good.

U. S. AS LAND OWNER—When present war programs are rounded out, it is estimated by the Byrd Committee of the Senate that the Federal government will own over one-fifth of the land area of the United States. Those who oppose Federalization of business and the political trends of the New Deal are worried about this situation. They note specifically the danger that a large percentage of the real estate of a country is no longer subject to taxation under state, county and town laws. Obviously, this means that the rest of the taxpayers have an increased share in the burden.

TAX COLLECTORS—Every food company is going to be a tax collector for Uncle Sam next year. Some people have worried a lot about this. Actually the situation under the proposed new simplified tax bill does not appear to be any different than the present one. Already Uncle Sam is using every employer to collect three kinds of taxes from workers. It is to be hoped that next year the collection of withholding tax and victory tax may be combined into a single job. Employers should use their influence to see that the law simplifies

their job both of collecting and reporting these funds. The employer needs a "simplified" law as much as the worker does.

FLASH-BACK ON HOGS—Washington played politics with the hog supply, seeking to increase farmer income for porkers by every device available. Now everybody from Farmer Jones to Mrs. Average Housewife is worried by the overweight pig, the surplus of lard, shortage of feed and a general upset. Apperently the Washington economists tried to repeal the law of supply and demand. They suspended its effect temporarily but at a very considerable present cost. Some even think that the result is going to prove very bad polities for the Administration.

MILLIONS OF MILES—Let's hope that as economy ceases to be compulsory with the end of the war, we shall not all rush back to excessive delivery service. Prompt and frequent deliveries are good advertising; but they can become excessively expensive if care is not taken. It will be well, during the emergency period which remains, to analyze the economies being achieved to see which are real and which are merely those of war necessity. Plans can then be made to make permanent the worthwhile savings that should be kept.

TRADE DATA RELEASED—All figures regarding imports and exports of the United States have been held secret for military reasons since Pearl Harbor. Now many of these figures are being released. Those who need data on food in the international trade of this country can get many figures that were not available formerly. All details for the calendar year 1941 are now released; and most of the trade data for 1942 on foodstuffs, especially all of that with Canada and Latin America, have been published. It thus becomes easier to make and carry out plans where foreign factors enter.

ACCIDENT COSTS—Washington has intensified its effort for industrial safety. One of the most potent arguments recently advanced is a demonstration of the indirect cost to industry of preventable accidents. One summary published in an educational leaflet by the Department of Labor shows that the indirect cost is usually from three to five times as great as the evident direct cost for compensation, medical service and obvious expenses.

SALARY RAISES—Many employers are losing skilled personnel to other firms because they have not given salary increases. Many have thought that they could not grant such raises as would normally be given to recognized skill and experience of salaried personnel. That is not correct. The Bureau of Internal Revenue has rules which permit without any special action the normal kinds of increases in salary for length of service and merit which were the established practice of a firm previous to 1942. There are also rules about wage increases for hourly and weekly paid workers.

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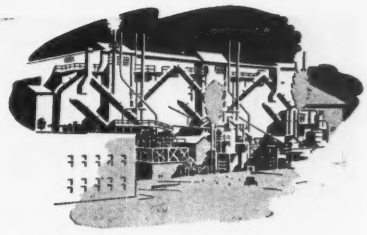

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MEN • JOBS • COMPANIES

INDUSTRY

Basic Vegetable Products Co., Vacaville, Calif., one of the largest vegetable dehydrating companies in the country, has been awarded the Army-Navy "E" for excellence in production.

Birmingham Ice & Cold Storage Co. is planning to construct a $100,000 locker plant in Birmingham, Ala., with a locker capacity of 1,000. The plant proposes to use the tunnel method of quick freezing.

Brown-Miller Co. has taken over the Widlar Division of Standard Brands, Inc., including its pickle plants at Wiggins, Miss., and Texarkana, Tex.

Evans Cannery Co., Longview, Wash., has added a fruit and vegetable quick freezing plant, with a 12-ton daily capacity, to its canning operation.

Kingan & Co., Inc., Richmond, Va., has begun operating the new $400,000 addition to its packing plant. The plant will be capable of handling 2,000 hogs daily in addition to the other livestock.

Kraft Cheese Co. is constructing an addition to its plant in Decatur, Ind., to step up production of dairy products for the armed forces. Milk condensing and evaporating equipment will be housed in the new part.

La Choy Food Products, Archbold, Ohio, a division of Beatrice Creamery Co., has purchased the packing and processing equipment of Farnsworth Fruit Farms, Waterville, Ohio. Apple juice and several other apple products will be packed by La Choy.

Nelson Crab and Oyster Co., Tokeland, Ore., plans to begin operations in Glacier Bay Packing Co.'s frozen food plant in South Bend, Wash., preparing crab meat for canning.

LOUIS A. PETRI

Petri Wine Co., San Francisco, Calif., has appointed Louis A. Petri president of the organization, succeeding his father, Angelo Petri, who has been named chairman of the board. The new president is a member of the OPA beverage section and also is a WFA advisor.

A. L. SCHIEL

H. J. Heinz Co., Pittsburgh, Pa., has elected A. L. Schiel executive vice-president, a newly created office. Mr. Schiel is a director of the company and for three years has served as assistant to the president. He was appointed a vice-president in 1943.

Pet Milk Co., St. Louis, Mo., is considering a plan for merger with Van Camp Milk Co., Fort Wayne, Ind. The plan of merger is subject to approval by Pet Milk's stockholders.

Prince Rupert Fishermen's Co-operative Association is constructing a fish processing plant at Prince Rupert, B. C., for the packing of fresh fish and mild curing salmon.

Treesweet Products Co., Santa Ana, Calif., has completed the construction of a new citrus juice canning plant in Phoenix, Ariz. Before installation of the plant, Phoenix growers had to ship their fruit to California for processing.

Blank & Stoller

VERNE BURNETT

Verne Burnett, vice-president of General Foods Corp. in charge of public and stockholder relations, has resigned his position to open an office as a public relations counselor. He is succeeded by Edwin B. Dooley, who has been Mr. Burnett's assistant. Mr. Burnett has directed General Foods' public relations for the past 14 years.

A. L. PULFREY

Formerly chief chemist in the Argo, Ill., plant, of Corn Products Refining Co., A. L. Pulfrey has been elected plant manager of National Starch Co.'s Dunellin, N. J., branch. Mr. Pulfrey, who has been with Corn Products for 20 years, is a member of American Chemical Society, Institute of Food Technologists and American Association of Cereal Chemists.

PERSONNEL

Charles A. Bogert, who has been with the Corn Products Refining Co., New York, for 27 years, has been elected comptroller of the company.

F. C. Buzzelle, General Mills, Inc., Minneapolis, Minn., has been appointed chairman of the Midwest section of American Association of Cereal Chemists. E. G. Rupp, Quaker Oats Co., was named vice-chairman.

D. T. Carlson, Northwest Ice Cream Co., Willmar, Minn., and Robert Prior, Washington State Dairy Products Commission, Seattle, Wash., have been re-elected president and vice-president, respectively, of American Dairy Association.

Edward B. Cosgrove, president of Minnesota Valley Canning Co., Le Sueur,

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Minn., and well known in the food field, has been made a member of the board of directors of Pillsbury Flour Mills Co., Minneapolis, Minn.

W. E. Dawson has joined Commodity Brokers, Inc., New York, as a consultant to bakers and other food manufacturers in the New York metropolitan area.

Henry B. Fangman has been named assistant to the president of Morton Packing Co., Louisville, Ky. Previous to his appointment, he had been associated with Consolidated Biscuit Co. for 17 years, most of that time directly connected with the Hampton Cracker Co., plant, in Louisville.

Jacob R. Feldman, Herbert S. Madsen and Charles Overbeck recently have been added to the laboratories staffs of General Foods Corp., New York.

A. E. Guest, formerly research chemist with Wm. Wrigley, Jr., Co., Chicago, is now with J. W. Allen & Co., Chicago.

Marcus L. Hamm has been named executive vice-president of North Carolina Dairy Products Association, with headquarters in Raleigh, N. C.

Frank J. Isenman, vice-president of Karcher Candy Co., Little Rock, Ark., has been elected president of the organization, succeeding the late Henry G. Leiser. He has been a member of the firm for 25 years.

John H. Kraft, executive vice-president of Kraft Cheese Co., Chicago, has been named president of the company, and also one of the vice-presidents of National Dairy Products Corp., New York.

Earl D. Jones has been appointed executive vice-president of Pratt Smith Produce Corp., New York. Prior to joining Pratt, he was executive vice-president of John Adams Henry, Inc., also in New York.

A. H. Mendonca is now production manager of F. E. Booth Co., San Francisco. Previous to his appointment, he was in charge of research and new product development.

C. B. Nichols, Happyvale Flour Mills, Griffin, Ga., becomes president of Self Rising Flour Institute, Inc., succeeding R. C. Blanton. J. R. Smithson, Attalla Co., Kosciusko, Miss., was named vice-president.

Hamilton W. Putnam has become manager of laboratories for Igleheart Brothers, Inc., a subsidiary of General Foods Corp. In his new capacity, he will direct the research and development work on flour, prepared mixes and milling improvement.

Irvin C. Shaffer, Just Born, Inc., has been reelected president of Association of Manufacturers of Confectionery and Chocolate and Samuel D. Fried, head of Up-To-Date Candy Manufacturing Co., becomes vice-president.

Norton Simon has been elected president of Hunt Bros. Packing Co., San Francisco, and F. R. Weisman, executive vice-president.

Joseph M. Waters has been elected to the senior board of directors of McCormick & Co., Inc., Baltimore, Md., manufacturer of spices, extracts and other food products.

LOOSE-WILES WINS THIRD ARMY-NAVY "E"

Proudly displaying the Army-Navy "E" award which Loose-Wiles Biscuit Co., Long Island City, N. Y., has won for the third time are (left to right) Stanley M. Jackson, director of nutritional research, Ralph H. Schust, vice-president, James Larrimore, director of government supply division and assistant manager of the New York bakery, Alan Wiedersum, New York bakery superintendent, and H. A. Clemmer, New York bakery manager. The pennant now bears two white stars, the second of which signifies that for the third time the company has maintained its high production level.

DEATHS

Paul L. Brown, 79, well known in the tea, coffee and molasses fields, April 27, in Littleton, Mass.

William H. Buck, 56, formerly an executive member of General Mills, Inc., Minncapolis, Minn., April 28, in Buffalo.

Bayard A. Church, 78, former assistant treasurer of Larrowe Milling Co., Detroit, Mich., May 6, in Detroit.

John G. Knippenberg, 61, president and treasurer of Country Club Ice Cream Co., Patterson, N. J., May 1, in Patterson.

A. B. Large, 71, former manager of Michigan Potato Growers Exchange, May 3, in Cadillac, Mich.

Charles T. Lee, former managing director of General Milk Co., Inc., and for many years vice-president of Libby, McNeill & Libby, Chicago, recently, in Rockledge, Fla.

Edward A. Parker, 54, vice-president of Western Division (Sperry Flour Co.) of General Mills, Inc., recently, in San Francisco, Calif.

Ira Wilson, 77, founder of Ira Wilson and Sons Dairy Co., Detroit, Mich., recently, in Palm Beach, Fla.

ASSOCIATED INDUSTRIES

Bastian-Blessing Co., Chicago, and the Pacific Division of Link-Belt Co., in San Francisco, have been awarded the Army-Navy "E" for excellence in production of vital war materials. Mack Trucks, Inc.'s three plants in Plainfield and New Brunswick, N. J., and Allentown, Pa., and Phillips Packing Co., Cambridge, Md., have been presented a second star.

Chain Belt Co., Milwaukee, Wis., has entered the food processing machinery field as a manufacturer of equipment for heat processing and rapid cooling in canning plants. Among the units being marketed are heat exchangers, micro-film deaerators and equipment for pasteurizing juices. These units have been acquired by Chain Belt following their development by Thermal Engineering Corp.

Willard H. Dow, one of the foremost leaders of research and chemical development, and at present president of Dow Chemical Co., Midland, Mich., has been awarded the Gold Medal Award for 1944 of American Institute of Chemists.

R. A. Dufour and **H. A. Leduc** have made available under license, patents covering the application of high-frequency heating in the production, processing and manufacture of foods, rubber, plastics and other products.

GRAIN ELEVATOR MEN
How to rapidly load and unload trucks, barges. Storage methods simplified, speeded. Rush-season efficiency—off-season economy. Page 9.

BAKERS
How to speed dough mixing, dividing, packaging. Installation assistance based on wide knowledge of bakery requirements. Pages 10 and 11.

CANNERS
How to boost peak-season output. More production per retort or fewer retorts for equal output—lower fixed costs. Pages 12 to 18.

DEHYDRATORS
How to handle product from raw-material to packaged stage simply and quickly. Make the most of your manpower. Page 19.

MEAT PACKERS
How to boost production per square foot of floor space with fewer men. Cut handling cost per pound. Pages 20 to 22.

LOCKER MEN
How to get economical, efficient, single-unit service for both fast-freeze compartments and storage lockers. Page 23.

Twenty-four pages of charts, tables, illustrations, and explanatory text—all this invaluable information contained in a single booklet for every man concerned with improving handling methods in the food industry.

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Meriden, Conn.	135 Colony St.
Newark	700 Bergen St.
New York	200 Varick St.
Philadelphia	410 N. Broad St.
Pittsburgh	H W Oliver Bldg.
Providence	44 Clifford St.
San Francisco	116 New Montgomery St.
Seattle	216 Walker Bldg.
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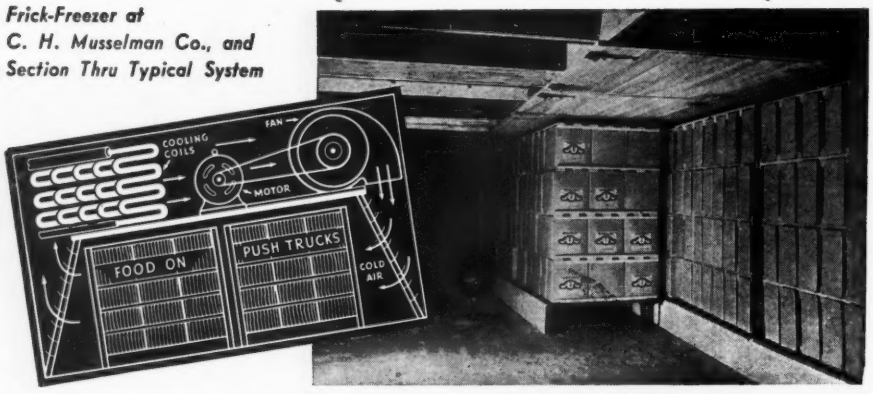
Frick-Freezer at C. H. Musselman Co., and Section Thru Typical System



Another Packing Plant Installs Frick-Freezing Equipment

This time for handling fresh apples, berries and other fruits. The C. H. Musselman Company, Biglerville, Pa., chose Frick-Freezing equipment after using Frick Refrigeration in this and other plants for nearly 10 years.

Frick-Freezers are setting the pace in revolutionizing the handling of foods! We believe more foods are already being frozen with Frick Equipment than by all other methods. Let us give you the whole story on Frick-Freezing. Write for Bulletin 147.

Frick Co., Waynesboro, Penna.

TRADE FRICK MARK Refrigeration

RYERSON STEEL IN STOCK

Call Ryerson for any kind, shape or size of steel you need. Steel for manufacturing, maintenance or construction ...all products are available for immediate shipment from any one of the ten convenient Ryerson Steel-Service Plants. Ask for a stock list...your guide to steel.

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STEEL-SERVICE PLANTS AT: CHICAGO, MILWAUKEE, ST. LOUIS, DETROIT, CLEVELAND, CINCINNATI, BUFFALO, BOSTON, PHILADELPHIA, JERSEY CITY

Sweden Produces Yeast For Nutritional Purposes

(*Continued from page 75*)

centrated foodstuff, forming a suitable supplement to food poor in protein content.

In striking a comparison between the prices of dry yeast and meat, it is assumed that the value of the meat's fat and salts content is offset by the yeast's content of carbohydrates, fat and salts. The albumens in meat and yeast are considered to be of equivalent value. On that basis, current meat and yeast prices are compared in Table III.

At present, the price paid for the beef and pork filling in prime quality "Falu" sausage is 2.10 Swedish crowns per kilogram, which, according to the above comparison, would mean a corresponding yeast price of 4.84 crowns per kilogram. The present price of yeast being 2.50 crowns per kilogram, it follows that yeast would be a particularly cheap meat substitute.

Dry yeast also should be judged on the basis of vitamin content, since it contains vitamins B_1, B^2, D and nicotinic acid in important quantities.

Research on Production Basis

(*Continued from page 65*)

1¾ in. higher than the outer edge. The spiral is constructed to form a flume 3 in. wide and 8 in. deep. The overall diameter is 32 in. An old oil barrel is used for the brine sump, this sump being 23 in. in diameter and 35½ in. high.

The brine pump is identical with that previously specified for the model washer. The pump discharge outlet is tapped for a 1-in. pipe, but a 1¼-in. one is used to discharge the brine into the center of the spiral since it is desirable to have a large volume of brine flow into the spiral at low pressure. A tank to hold concentrated brine is installed on the second floor of the pilot plant. This facilitates the adjustment of brine to the desired salimeter reading.

Salt Removed in Flumes

The peas are discharged from the quality separator as fancy or rejects into two separate flumes. (Fig. 7). These flumes are 55 ft. in length and are used to wash the salt from the peas as they are carried to the picking tables. Joints and bends in the flumes are nailed to a wood framework and then soldered. The flumes are in-

stalled so that they have a pitch of ¼ in. to the foot.

Fancy and reject peas are discharged upon separate picking tables. The reject table is located nearest the separator, and the "fancy" table is readily accessible to the workers, since skins, splits and foreign material generally discharge with the floater peas. The framework of the picking table is made entirely of wood. The pulleys are 10 in. in diameter, while the rubber belt is 9¼ in. wide. The picking tables are 5 ft. 2 in. long, the overall width is 32½ in., the height from the floor, is 31 in.

A Worthwhile Discovery

During the 1943 packing season, this pilot plant was used to great advantage. An illustration of its worth is seen in the findings concerning the value of brine temperature control in quality separation. It was discovered that when brine is kept at room temperature, or below, separation is much superior to that when brine rises above room temperature. Since the temperature of the brine in the separator has a definite inclination to rise during its operation, the findings can be considered a real contribution to the technology of frozen foods.

Acknowledgment

The authors are indebted to M. G. La Rowe of the Birds Eye-Snider Division of General Foods Corp. for his general assistance in the construction of the pilot plant; and to Roy Gaze of the same company, who built the hot-water blancher and did some work on the quality separator.

The British Develop Empire Foods

(*Continued from page 85*)

creased 23 percent in pasteurized dill pickles and 26 percent in salt-stock pickles. Vitamin decreases where indicated were for vitamin B_1, riboflavin and ascorbic acid (which declined 50 percent in six weeks), the salting process producing the greatest loss for water-soluble vitamins.

Native Foods Explored

In the Scottish Highlands near Inverness, a new cannery has been formed to explore local "wild" foods, including canned hare soup, canned venison steak in casserole or stewed with vegetables, canned perch and canned beef and mutton.

Bananas in the Kiambu district of Kenya, East Africa, are being cut into strips, dried in the sun for three days and then ground into flour for bread

It's a long way back to the cat in the cracker barrel

Maybe the cat in the cracker barrel never did much harm to customers of the crossroads store. But it's a cinch that cat-in-the-cracker-barrel methods are not tolerated in today's scientifically managed food processing, preserving or packing plant.

Matching the advances in food science with cleaning progress is the Wyandotte Representative, with his full line of cleaners to answer every need in the food industry — from washing a test tube to cleaning an out-sized vat.

Whether your business is food packing, processing, debulking, dehydrating or quick freezing — your cleaning job simple or highly complex — the Wyandotte Representative has the products and the "know how" to clean and provide germicidal protection for food utensils, equipment or containers. He is a specialist, too, in cleaning walls, floors, or any part of your plant.

You can have the help of your Wyandotte Representative just for the asking. Why not call him in today?

Wyandotte

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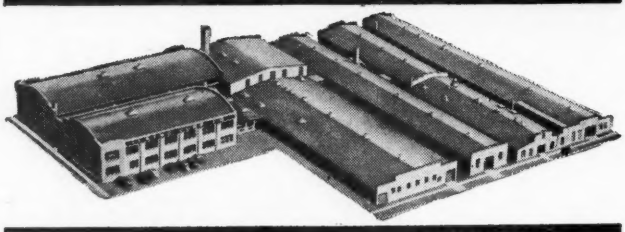

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Viking output today is going practically 100% to the armed forces. But in the rush of War work, we haven't forgotten that this Company, which includes its own iron and brass foundries as well as manufacturing plant, grew to its present position of leadership with just one object in view . . . to more economically serve YOU, our valued civilian customers, by consistently building better rotary pumps from year to year.

We look forward to the return of Peace when we shall again be privileged to build dependable Viking Rotary Pumps for civilian customers, large and small, in many industries . . . to provide the same reliable, efficient Viking service you have been accustomed to. Until that day, please accept our sincere thanks for your continued patience and courtesy under today's trying conditions.

If you have a Viking Pump, please keep it in good shape as long as possible. The Viking Service Manual offers valuable pointers. Write for your FREE copy today. If you are interested in new pumps for postwar service, write for Catalog 42-G, illustrating the complete Viking line. It is FREE for the asking.

VIKING PUMPS — REGISTERED TRADE MARK — FIRST IN AMERICA

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Why the *Steinlite* is TOPS

There are more Steinlite electronic moisture testers in use than all other electric types combined. In dehydration of eggs, carrots and numerous other foods the Steinlite is considered "Tops" as a production control instrument . . . as well as a laboratory unit. Guaranteed accurate to .2 of 1%. Models available to cover 2 to 35% moisture range.

The Steinlite One Minute Moisture Tester

The Steinlite is FAST—a test can be made in 1 or 2 minutes.
It is ACCURATE—calibrated against official Government oven methods.
EASY TO USE—like tuning a radio.
LOW UP-KEEP—consumes about as much electricity as a 40-watt bulb.
PORTABLE—light, neat and compact.
DURABLE—made of the very best materials—built to last.
Order your Steinlite NOW. Immediate shipment from stock. No money paid in advance. Free trial.

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making. A bunch of bananas weighing 40 lb. produces approximately 3 lb. of flour.

New storage and transportation methods for the perishable products of the British West Indies are being investigated by the Low Temperature Station at Trinidad. A canning officer has been appointed by the West Indies government to supervise the extension of the canned food industry on the islands.

In Britain and New Zealand, attention is being paid to the production of agar-agar from native seaweeds. The Russians have made considerable progress in producing this food from red seaweeds on the Siberian coast. Agar-agar was formerly a Japanese monopoly.

Food Fish Dehydrate Well

(*Continued from page 78*)

(0.097-in. perforations), and by allowing to drain for 2 minutes. The sieve was tilted slightly to facilitate draining. The greatest quantity of water that the product will absorb is expressed as maximum reconstitution. The data of Table IV show that the rehydration ratio does not always correspond to the drying ratio. Rockfish and salmon rehydrated to more than the original cooked weight.

In the rehydration of fish tissue, water temperature was found to have no appreciable effect upon either the rate or degree of reconstitution. Hence in preparation for table use, water of the most convenient temperature could be added. The method of dehydration and the time allowed for rehydration probably have the greatest effect. The data shown in Fig. 3 indicate the trend in rehydration. Dehydrated rockfish and true cod required about 25 to 30 minutes to reach maximum rehydration. Squid was the slowest to rehydrate and did not reach maximum rehydration in 60 minutes; in fact, it was still rehydrating after 120 minutes. Salmon rehydrated to 97 percent of its maximum in one minute and to its maximum in about 5 minutes. Actually, this product could be considered to rehydrate almost instantaneously—more rapidly than any other fish encountered.

Pilchard cooked 20 minutes at 228 deg. F. (short cook), then pressed hot for removal of oil, rehydrated less rapidly but to a greater extent than a similarly treated sample which was cooked 60 minutes at 240 deg. F. (long cook). The long cook-unpressed

pilchard, from which no oil was removed by pressing, rehydrated much more slowly and to a much lesser extent, primarily because of its high oil content. Unpressed dehydrated pilchard may contain as much as 45 percent fat. The replacement of this fatty material with an equal weight of pressed tissue would obviously increase the percent rehydration.

Possibilities For Use

Dehydrated fish alone cannot be prepared for the table directly by boiling, frying or baking as with fresh fish. Fish which has been dehydrated gives the most palatable dishes when incorporated into recipes calling for vegetables and cream sauces or potatoes. When so used the reconstituted product should not exceed the total weight of the other ingredients. Chowders, creamed dishes and fish puffs or fluffs provide the better recipes in which this material can be incorporated for use in the diet. Its convenience in preparation can be most appreciated in institutional feeding.

Dehydrated Chowder

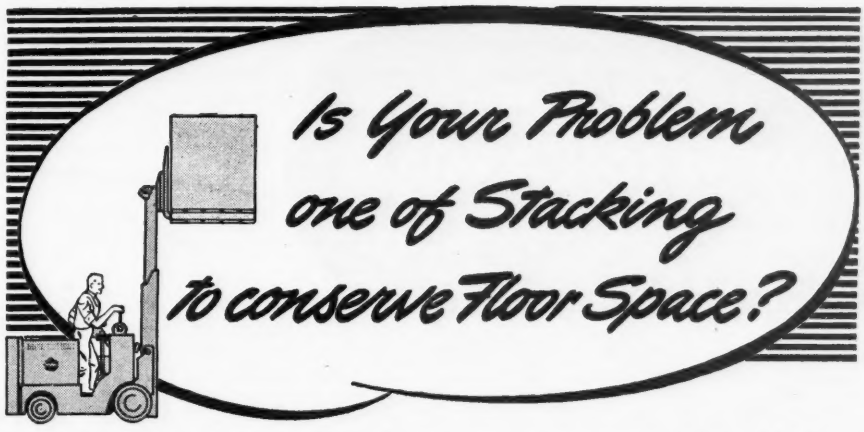
One of the most promising products developed at this laboratory is an all dehydrated fish chowder mix which requires only the addition of water and heating for preparation. Every ingredient in this mix, with the exception of flour, salt and seasoning, has been dehydrated individually. These are fish, pork, onion flakes, potatoes, tomatoes (optional) whole milk, flour, and salt and pepper.

These ingredients when combined in the right proportions can be packed in hermetically sealed containers for use in emergency rations. Individual-size servings can be provided. The container when opened and emptied will serve as a convenient liquid measure with which to add the water for rehydration. This chowder mix, with its numerous ingredients of high food value, will provide sufficient nourishment to serve as the main dish in any meal.

Summary

Fish flesh can be easily dehydrated and the product is quite palatable when fresh. Storage of the dehydrated fish is a greater problem than the preparation, and the work on this phase is being continued.

As with other dehydrated foods, the keeping quality of dehydrated fish is adversely affected by high moisture content, and deterioration is much more rapid in storage at 100 deg. than at 70 deg. F. Of the containers tested, only tins have been successful for any extended storage of the dehydrated product.



Hundreds of plants and warehouses have solved this and other material handling problems with Baker Trucks. So that you may profit from their experiences, a large part of our new catalog has been given over to actual installation stories. A few cases in point are listed below:

★ ★ ★

A leading industrial engineer was given the job of designing a large model warehouse for the world's largest paint manufacturer. Baker Trucks and Tractors were specified to bring about top efficiency in the sorting, storing and shipping of the more than 10,000 items handled in this warehouse. Illustration shows one of their fork trucks stacking pallet loads of drums three-high.

One of the problems confronting the planners of this warehouse was to find a way of getting at "buried" loads with a minimum of time and effort. This was solved by steel racks—permitting the fork truck to remove the lower pallet without disturbing cartons above.

A large west-coast processing plant saves thousands of dollars annually through the use of telescoping lift trucks. The Baker Fork Truck illustrated is tiering heavy pallet loads three- and four-high to conserve warehouse space.

In paper mills, print and publishing shops, Baker Trucks have more than doubled the value of warehouse space by permitting stacking to the ceiling. Reductions up to 80% in handling costs are reported. One publisher paid for his truck in 18 months' rental savings alone.

A Baker Material Handling Engineer was called in to make a survey of a large food warehouse. Upon his recommendations, a fork truck plus a conveyor system was installed. Operating costs were reduced from 6.68c to 4.98c per ton, a saving of 25.4%. Gross savings amounted to $153 per week or $7956 per year.

The problem of stacking steel sheets has been successfully met in steel mills and metal working plants through the use of heavy duty fork trucks, handling sheets on pallets—or equipped with rams for handling heavy rolls. A special roll-over attachment tiers rolls either vertically or horizontally.

WRITE FOR YOUR COPY

Plant and production managers, traffic managers, superintendents, purchasing agents and any others concerned with material handling will find the new Baker Catalog No. 52 a valuable reference.

BAKER INDUSTRIAL TRUCK DIVISION

of The Baker-Raulang Company

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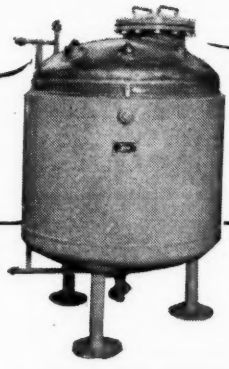
In Canada: Railway and Power Engineering Corporation, Ltd.

Baker INDUSTRIAL TRUCKS

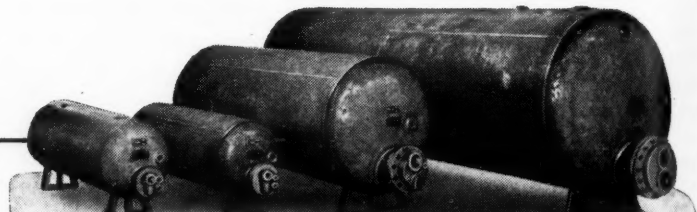
Typifying
PATTERSON-KELLEY
Service and Products

Equipment
FOR PROCESSING AND KEEPING FOOD PRODUCTS

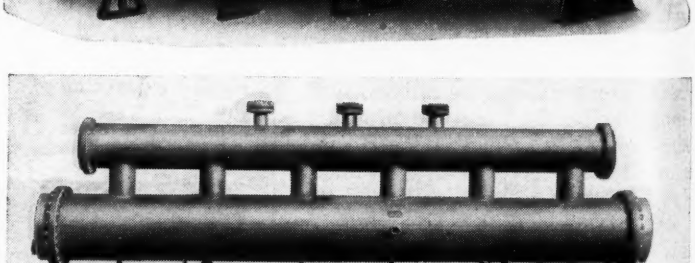
Cooking Kettles
WITH OR WITHOUT MIXERS



Special Storage Heaters
FOR PROVIDING CLEAN HOT WATER



Coolers
FOR THE EFFICIENT USE OF REFRIGERANTS



Equipment such as illustrated, is efficient only to the extent that the transfer of heat itself is efficient. That's the key to successful cooking, heating, cooling operations.

Solving heat-transfer problems as they pertain to kettles, mixers, coolers, storage heaters, heat exchangers, coolers, etc., has engaged the attention of Patterson-Kelley engineers for many years. We can offer help in designing special apparatus. Our shop men have fabricated all kinds of equipment along these lines from many kinds of metals. They're experienced.

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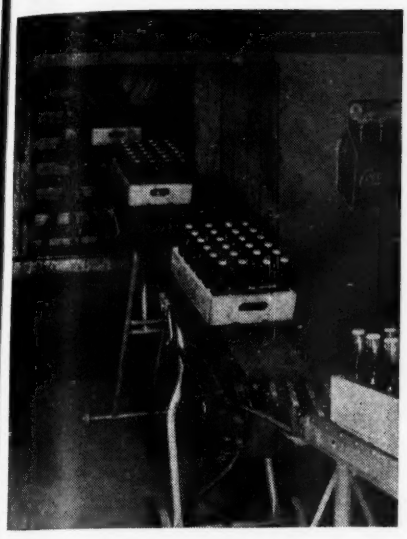
FOOD EQUIPMENT NEWS



Portable power conveyor loading carbonated beverages into truck.

Portable Power Conveyor

STEVEDOR, JR., is the name of a small, portable, power-belt conveyor now made by Rapids-Standard Co., Inc., 535 Bond Ave., Grand Rapids, Mich. It is designed for such jobs as loading cars and trucks and for low stacking operations. It also serves as a booster in a gravity conveyor line.

Quick-acting, safety type Cam-lock supports provide a wide range of adjustments to meet varied operating conditions. The conveyor operates at any adjustment from a horizontal level of 14 in. to a delivery height of 74 in., at a maximum operating pitch of 30 deg.

The conveyor is equipped with a right-angle gearhead motor, which operates on 110 volts. At 30 percent pitch, it will carry a 225-lb. distributed load at a speed of 50 ft. per minute.

There are two standard models, one with an 8-in. belt and a ⅓-hp. motor, and one with a 12-in. belt and a ½-hp. motor.

The frame is fabricated of steel, and the belt is a special rough-top rubber-covered 3-ply canvas. A reversing switch and adjustable guard rails can be supplied.

Vibrating Screens

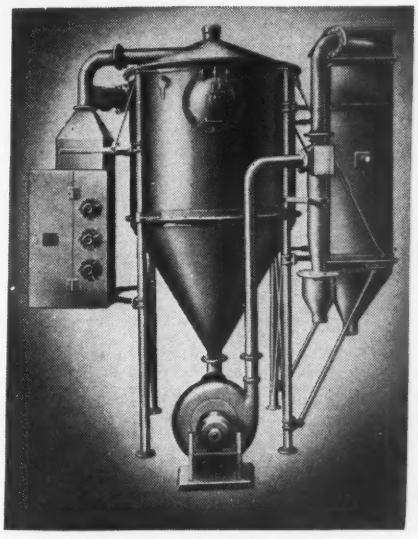
IN the design of the end-tension deck, available on vibrating screens made by Allis-Chalmers, Milwaukee, Wis., a new tensioning principle is employed. This deck was designed to meet the need for a deck which eliminates transverse arching of the screen surface. By employing a series of longitudinally-tensioned, transversely flat, screen surfaces, the end-tension deck inherently maintains an even depth of material.

The screen is tensioned by clamp bars at the ends of the screen and by intermediate adjustable bars when more than two screen sections are used. A distributing plate at the feed end of the screen spreads the material uniformly over the width to reduce surface wear.

Sections of the deck may be turned end for end and upside down for longer screen life. Transverse supporting bars on the underside of the deck are covered with molded rubber strips and act as individual drip strips to assist in more efficient draining of the material in washing and dewatering processes. The feed end of each section can be furnished with a blank surface designed to obtain a pool-washing effect for scrubbing and scouring the material.

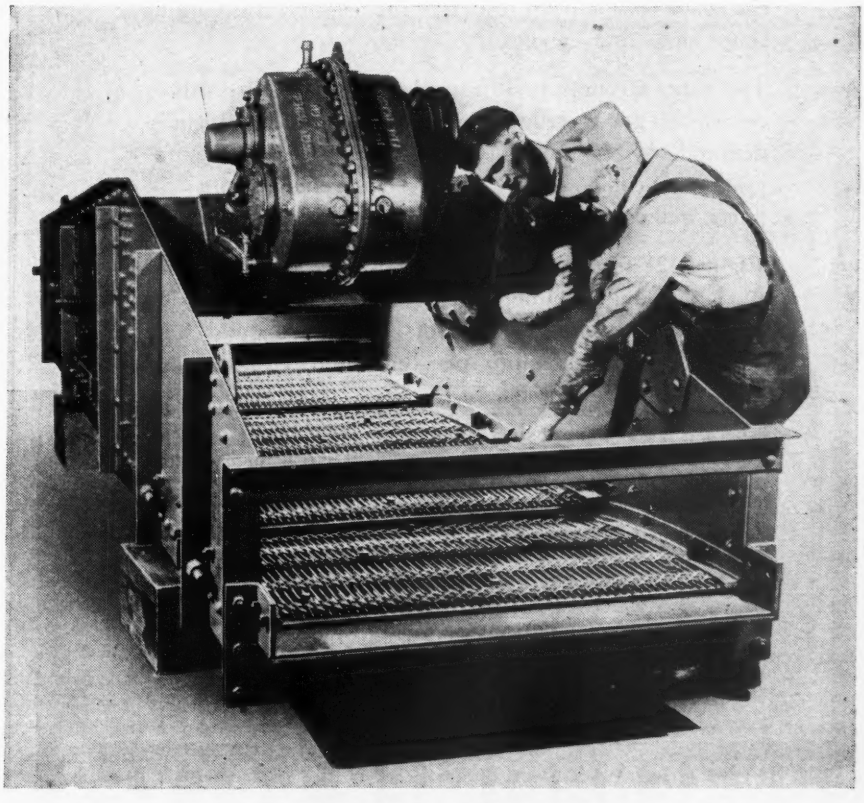
Small Spray Dryer

WESTERN PRECIPITATION CORP., 1016 W. 9th St., Los Angeles, Calif., announces the development of Type N Turbulaire spray dryer for commercial drying of high-value products. It is intended for use in laboratory research and pilot-plant operation on specific materials. Described as a "completely packaged job," the dryer is said to offer a number of advantages for investigating spray-drying problems.



Pilot-plant spray dryer.

It is furnished in black iron, stainless steel or other alloys. Standard equipment includes an electric heater, a 4-ft. desiccator with a cone bottom and a hand-operated mechanism for



End-tension deck for vibrating screens.

THEY'RE TOUGH . . .
THESE 125 lb. GATE VALVES

125 lb. S.P. Bronze Gate Wedge Disc, Non-Rising Stem

125 lb. S.P. Bronze Gate Double Disc, Rising Stem

And they're proving it...in exceptional lasting qualities ...in dependable performance under trying conditions ...in less attention and fewer repairs...in short, in all the ways that add up to better service and a saving of time, labor and expense.

The extra strength built into these tough bronze valves comes in good stead in withstanding the punishing demands of continuous operating schedules. The simplicity of design and precision interchangeability of parts makes servicing easy and speeds maintenance.

Figures 2125 and 2129 (illustrated) are typical examples of Lunkenheimer correct engineering—carried through in a complete line of bronze, iron and steel valves, for all prevailing pressures and temperatures.

Lunkenheimer products are available from distributors everywhere. One of these distributors is near you to assist you with your maintenance and operating problems. His complete facilities and wide experience are at your call.

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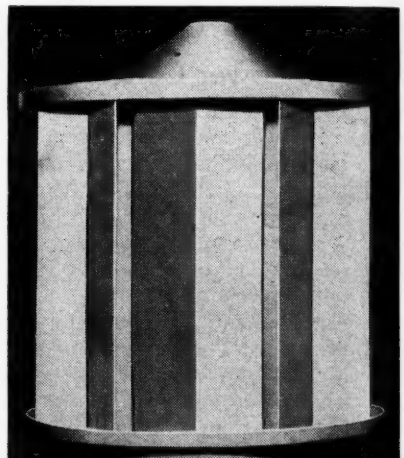
sweeping surface accumulations from the conical section, collector, fan, bag house and control instruments—all mounted on a single frame for compactness and easy installation. It occupies floor space of only 5 ft. x 9 ft. 8 in., with headroom of about 10 ft. 6 in. Operating flexibility is gained by means of optional heaters—either direct or indirect types. The desiccating chamber has a secondary inlet for introducing tempering air, at inlet temperature or precooled to any desired temperature. Other optional equipment includes an air filter and sealed glass ports for inspection purposes.

The Type N Turbulaire has an evaporation rate of 25 lb. of water per hour at an inlet-to-outlet temperature differential of 300 deg. F.

Positive Ventilator

POSITIVE VENTILATION, regardless of wind direction or velocity, is said to be attained with a wind-actuated exhauster announced by Air Devices,



Wind-actuated ventilator.

Inc., 17 E. 42nd St., New York 17, N. Y. There are no moving parts in this Agitair unit, so maintenance is no problem. The unit is weatherproof and lightproof, and it provides positive elimination of downdraft.

Electronic Relay

BY AMPLIFYING the current transmitted by delicate control contacts or high-resistance circuits, an electronic relay introduced by General Electric Co., Schenectady, N. Y., materially increases the application range of many control devices. Operated by any material having a resistance of from 0 to 500,000 ohms, or greater if necessary, the new relay is especially suitable for controlling liquid level in tanks and boilers.

It has a limit switch requiring very

Electronic relay for use with control devices.

small pressure to operate, and is small and light in weight for easy installation. The relay consists of a standard electronic tube, a supply transformer and an electromagnetic relay, all mounted in a totally enclosed, weather-resistant case suitable for wall or machine mounting.

In operation, the electromagnetic relay is kept energized as long as the controls connected to the input grid circuit of the electronic tube remain open. The instant these contacts close, the relay is de-energized. A built-in time-delay feature prevents chattering when the contacts in the input circuits are momentarily closed. A contact arrangement on the electromagnetic relay permits the device to be used either to make or to break a load circuit when the actuated contacts connected to the input circuit on the electronic relay are closed.

Propeller Flow Meter

MANY improvements are incorporated in the new propeller-type flow meter made by Builders-Providence, Inc., 9 Codding St., Providence 1, R. I. This Propeloflo meter is designed for main-line metering. Improvements include streamline Venturi construction which evenly distributes the force of the flow against the full area of the propeller to attain high accuracy throughout a wide range of flow. Spiral flow is eliminated by straightening vanes upstream of the propeller.

The meter has an eight-blade bakelite propeller molded in one piece. Rotation is transmitted through spur and bevel gears, and the shafts rotate in ball bearings to assure maximum power to drive indicating and recording devices or proportioning chemical feeders.

The propeller hub, bracket and nose

NOW is the time to think about giving your product that EXTRA margin of protection which is so necessary in the hot, humid summer days ahead . . . when bacteria and mold thrive and multiply . . . when extra vigilance is indispensable if the quality and flavor of your product are to be maintained.

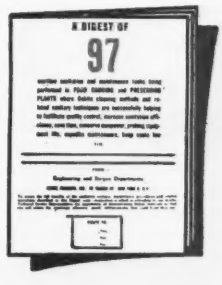
PLAY SAFE! Decide now to use the time-tested two-step Oakite method, and your product will be effectively safeguarded against bacterial contamination and spoilage. FIRST, remove vegetable and fruit particles, meat residues, grease, fat, sauce, syrup or other matter from processing, mixing, handling equipment, floors and walls with FAST-WORKING Oakite cleaning materials. THEN, after all surfaces are in physically clean condition, spray, flush, brush or swab surfaces with a solution of

OAKITE BACTERICIDE
(PROTECTED BY U. S. PATENT)

Possessing a more active form of available chlorine, this effective germicidal material swiftly destroys bacteria, mold and mold spores. It gives your product an EXTRA MARGIN OF PROTECTION . . . makes quality control MORE CERTAIN. Completely soluble, it is instantly ready to use. Drains freely, too . . . leaves no white residues on equipment.

New, Data-Filled Digest FREE!

Here is a NEW, unusually informative, 24-page Oakite Digest that gives time-proved methods and formulae for handling 97 essential food plant sanitation and maintenance tasks. Send for your FREE copy of this helpful wartime guide TODAY!



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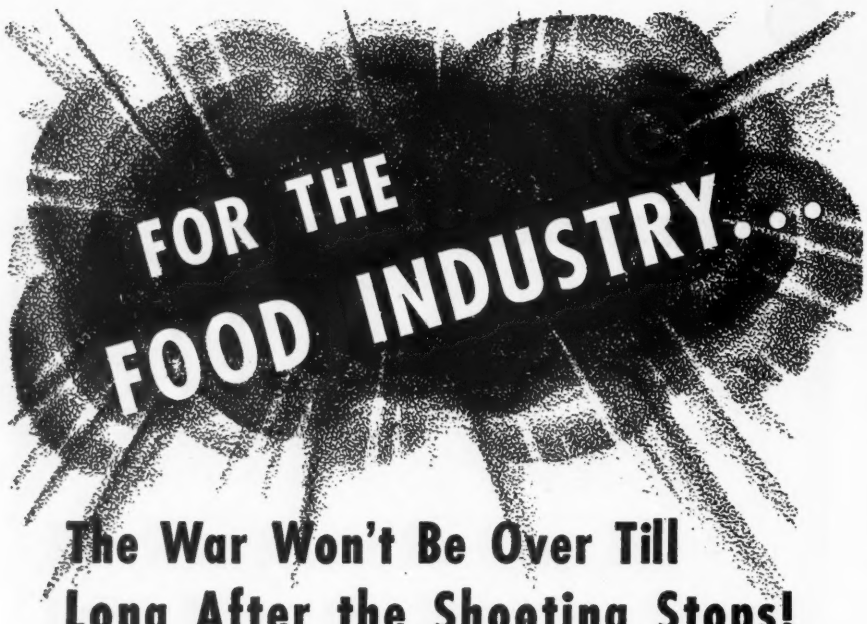
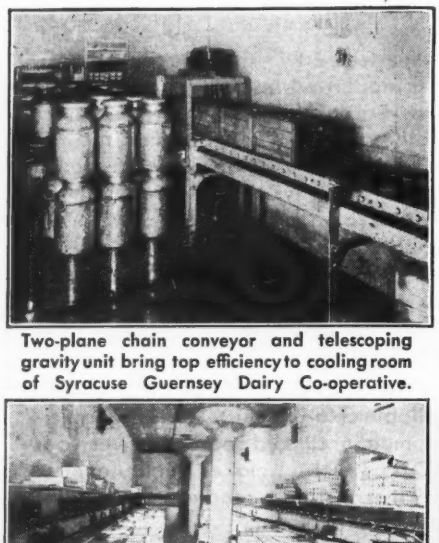


The War Won't Be Over Till Long After the Shooting Stops!

Some of our war-spurred industries, busily turning out combat equipment, will be faced with the task of reconversion to a peace-time economy the minute the war ends.

But the food industry must continue to produce its utmost for years to come—until vast regions desolated by war or stripped by a greedy foe can be nursed back into full production.

No one in the food business, now handling increased volume, need put up with obsolete handling methods on the supposition that the increase is temporary. Lamson invites you to send for illustrated literature, showing Lamson conveyors at work, and to consider the savings in money, time and manpower, and the increase in efficiency that can be achieved with up-to-date materials-handling equipment.



Two-plane chain conveyor and telescoping gravity unit bring top efficiency to cooling room of Syracuse Guernsey Dairy Co-operative.

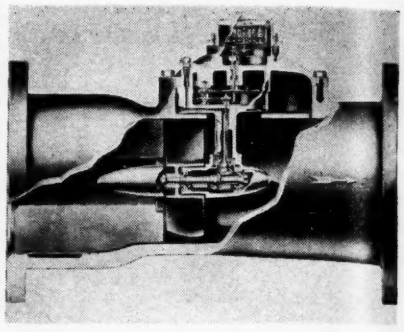
No congestion in this egg-room at Safeway Stores, Los Angeles. Egg packers receive empty cartons by conveyor. Return belt of same conveyor takes filled cartons to storage.

Faster assembly of orders is accomplished with less labor in this warehouse by using a Lamson overhead conveyor to haul the trucks. Safeway Stores, Oakland.

LAMSON CORPORATION

Dept. FI *Syracuse, N. Y.*

Makers of CONVEYORS and PNEUMATIC DISPATCH TUBES



Improved propeller-type flow meter.

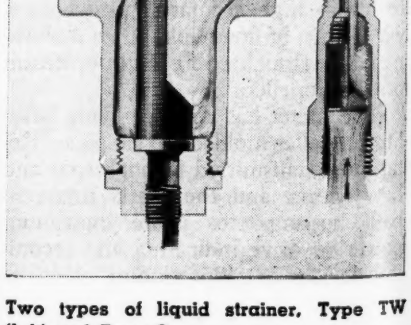
are streamlined to reduce flow disturbance and divert fine grit, sand or scale away from the mechanism. The unit has a one-shot lubrication system, readily accessible stuffing box and a propeller mechanism which may be removed easily for inspection.

Wide range, accuracy, low-pressure loss in the measurement of liquid flow in lines 6 in. and larger in diameter, are claims by the manufacturer.

Liquid Strainers

IN TWO TYPES of liquid strainers developed by Spraying Systems Co., 4023 West Lake St., Chicago 24, Ill., improvements have been made in design and construction. One of these strainers, Type TW, is used where several nozzles are to be installed on a single feed line. The strainer has a large open screen area in relation to the pipe area of the line, so that it may handle the full capacity of a line supplying several nozzles. A blowout plug makes the strainer easy to flush and clean without removing it from the line. The Type TW is supplied with a cast iron body and brass wire screen; all-brass or all-stainless-steel construction is also available.

The other new strainer is the Type Q line strainer. It is employed for single-nozzle installation. Maximum capacity is one gallon per minute of water, brine, oil and liquids of similar viscosity. The screen is removable to facilitate cleaning.



Two types of liquid strainer. Type TW (left) and Type Q.

CATALOGS & BULLETINS

FOOD PLANT EQUIPMENT

Air Compressors—Tank-mounted feather-valve air compressors are illustrated in Bulletin H-620-B21C, a 4-page publication which pictures three types of air compressors, and gives specification charts for each; issued by Worthington Pump and Machinery Corp., Harrison, N. J.

Centrifugal Pumps—"Centrifugal Pumps for Beet Sugar Mills," Bulletin 7019, illustrating various kinds of centrifugal pumps used in beet sugar processing, has been issued by Ingersoll-Rand Co., Cameron Pump Division, 11 Broadway, New York 4. A two-page flow sheet of a typical beet sugar factory is also given.

Combustion Equipment—Practical information on the determination, selection, installation and operation of combustion methods and equipment is presented in a 112-page revised edition of "Industrial Combustion Data" by Hauck Manufacturing Co., 124-136 10th St., Brooklyn, N. Y. Numerous capacity tables, dimension charts, diagrams and photographs are found in the publication.

Feather-valve Compressors—Pictures and cross sectional views of motor driven, direct connected and belted feather-valve compressors are shown in Bulletin L-667-B1 by Worthington Pump and Machinery Corp., Harrison, N. J.

Gas Engine Compressors — Gas-engine compressors, available in five sizes—from 400 to 1,000 b.hp.—and used in processes where continuous operation and long compressor life are needed, are described and illustratd in Bulletin L-690-B1, a 26-page publication distributed by Worthington Pump and Machinery Corp., Harrison, N. J.

Gas Exhausters and Boosters—Numerous advantages of rotary positive gas exhausters and boosters are discussed, and operating principles, features of design and construction and efficiency curves are given, in 20-page Bulletin No. 32-33-B-12 by Roots Connersville Blower Corp., Connersville, Ind.

Metal Tanks—Cross sectional diagrams and photographs illustrating metal tanks built for pickling, can cleaning, dish washing, bottle washing and automotive parts cleaning are given in an 8-page catalog put out by Tivit Products Co., 8024 S. Vermont Ave., Los Angeles 44, Calif.

Power Pumps—Manual or automatic variable-stroke triplex power pumps, which combine the advantages of constant-speed drive and full-capacity control, are described and illustrated in Bulletin W-413-B30 by pictures and a schematic diagram showing pumping and control mechanisms; published by Worthington Pump and Machinery Corp., Harrison, N. J.

Rotary Pumps—A diagram of an operating pump cycle, pictures showing how a pump works and illustrations of standard pump units can be found in Bulletin 304, "Facts About Rotary Pumps," distributed by Blackmer Pump Co., Grand Rapids 9, Mich.

Scales—Eighteen types of precision measuring and weighing Detecto-Gram scales are illustrated and briefly described in a catalog sheet issued by Detecto Scales, Inc., 1 Main St., Brooklyn, N. Y.

Step-valve Pumps—Bulletin 4311, a 4-page manual containing photographs and operating data about step-valve pumps, available with electronic volume control, is distributed by Milton Roy Pumps, 1300 E. Mermaid Ave., Chestnut Hill, Philadelphia 18, Pa.

Water Purification—The purification of water by the ion-exchange process is discussed and the double-unit ion exchanger equipped with lever-operated single control valves is illustrated in 6-page Bulletin W-212-B4 published by Worthington Pump and Machinery Corp., Harrison, N. J.

PLANT SUPPLIES

Active Carbon—A wealth of material on active carbon, used in decolorizing, deodorizing and purifying oils, fats and related products, is found in a 43-page booklet published by Industrial Chemical Sales Division, West Virginia Pulp and Paper Co., 230 Park Ave., New York 17. The treatment of oils and fats of a semi-drying character, the mechanical application of active carbon to fatty oil and the general uses of active carbon are some of the topics discussed. This is really a little textbook, rather than a catalog.

Calcium Chloride — Thirteen different pamphlets briefly describing how calcium chloride is used in such operations as melting and skidproofing icy surfaces, dustproofing, providing protection against freezing and evaporation and preventing refrigeration breakdowns have been put out by Wyandotte Chemicals Corp., Wyandotte, Mich.

Conveyor Belts and Wire Mesh Guards—Photographs and specifications for woven chain link or flat wire conveyor belts, used in food production, dehydration and canning industries to carry all kinds of materials regardless of weight or size, have been given in a catalog issued by Cyclone Fence Division, Waukegan, Ill. Illustrations of wire mesh window guards and sectional barriers are also shown.

MATERIALS HANDLING

Chain Belts—An 8-page catalog describing Rex Z-metal chain belts for more economical drive and conveyor service in many industries, and including pictures of typical installations and of 11 different types and sizes of chain belts, has been published by Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.

Industrial Trucks—Pictures and dimensions of gas- and battery-powered lift trucks, dump trucks, a platform Tructractor and a power shovel to speed the handling of materials have been given in a vest pocket 72-page catalog by Clark Tructractor Division, Clark Equipment Co., Battle Creek, Mich.

Pumps—Cross-sectional pictures, composite rating tables and dimension charts of single-stage balanced "Monobloc" centrifugal pumps, sizes 1 to 5, are given in Bulletin W-321-B14B, put out by Worthington Pump & Machinery Corp., Harrison, N. J. These pumps are to be used in such operations as bottle and can washing, in pumping volatile, nonhazardous liquids, in circulation systems and for general water service. Bulletin W-321-B15 contains similar information about two-stage balanced "Monobloc" centrifugal pumps.

Sugar Mill Chain Belts—Designed to give greater strength and resistance to corrosion and abrasion in sugar mills, double-sprocket Rex intermediate chain belts, cast in both malleable iron and Z-metal, are described and illustrated in Bulletin 438 by Chain Belt Co., 1600 W. Bruce St., Milwaukee, Wis.

MISCELLANEOUS

Fly Chaser Fan—A general description, operating data and pictures of typical installations of fly chaser Deflek-Aire fans, which blow a continuous stream of air down so that flies cannot pass through, are given in Bulletin 230 by Reynolds Electric Co., 2650 W. Congress St., Chicago 12.

Preservative—A compilation of history and technical preserving data for food processors and beverage manufacturers and an up-to-date tabulation of state laws regulating the use of sodium benzoate in food products are found in 24-page "A Treatise on Benzoates," by Seydel Chemical Co., 225 Mercer St., Jersey City 2, N. J.

Tire Repairs—Methods for repairing synthetic tires and tubes are illustrated and described in an 8-page service bulletin published by B. F. Goodrich Co., Akron, Ohio.

BOOKS

Sweden in Wartime

SWEDEN, A WARTIME SURVEY. Edited and published in Sweden with the assistance of public authorities. Distributed by The American-Swedish News Exchange, 630 Fifth Avenue, New York, N. Y. 250 pages; 5½ x 8¼ in.; cloth. Price, $2.

The food industry, like all industrial America, is becoming more and more fully aware of Europe's importance in our postwar economy. For that reason authentic information about any of the European nations, since 1939, is welcomed as a possible foreshadowing of the factors that will play a part in that economy. Sweden, still remaining outside the conflict, is one of the few countries from which authentic information can be drawn. And this book provides much of that information.

By means of a series of articles, the volume illustrates the measures Sweden has taken toward solving the military, social and economic problems confronted by it since the outbreak of the war. The chapter on the food supply as effected by the blockade and by poor harvests in 1940 and 1941 is especially interesting, as are the tables showing food exports from 1939 to 1942.

The book also points out the industrial readjustments that have been necessary and devotes considerable space to the part the consumer cooperatives have played during these critical years.

Warehouse Loans

FINANCING INVENTORY ON FIELD WAREHOUSE RECEIPTS. By Neil H. Jacoby and Raymond J. Saulnier. Published by the National Bureau of Economic Research, 1819 Broadway, New York, N. Y., 1944. 89 pages; 6⅛x9½ in.; cloth. Price, $1.50.

The standards and practices developed in extending credit against warehouse receipts are discussed in this study, which is part of the business financing project of the National Bureau of Economic Research. A development of recent years, the method offers a sound procedure for supplying working capital to industry.

The authors estimate that there were at least 5,000 field warehouses in the U. S. in mid-1941, and the amount of outstanding credit secured by field warehouse receipts was about $150,000,000. The majority of business concerns financed had total assets of between $25,000 and $200,000. It is also noted that canned foods and groceries accounted for a large percentage of warehouse stocks.

The book covers field warehouse operations in all its phases and details the procedure for securing loans. Bank participation, credit standards and the cost of credit to the borrower also are outlined.

Both authors are associated with the national research program of the bureau. Mr. Jacoby formerly was engaged in investment banking in Chicago and is now professor of finance in the school of business and secretary of the University of Chicago. Mr. Saulnier is assistant professor of economics at Bernard College, Columbia University.

How Much Food for Europe

FOOD FOR POSTWAR EUROPE: HOW MUCH AND WHAT. By M. K. Bennett. Published by Food Research Institute, Stanford University, California, March, 1944, as War-Peace Pamphlet No. 5. 100 pages; 6x9 in.; paper. Price, 50 cents.

It is generally agreed that feeding Europe for a year or two after the close of hostilities is a task that must be accomplished somehow. This pamphlet tries to bring that task into focus by facing the questions posed in the title.

The food situation in greater Europe before the war is considered first; then come the changes that have occurred since 1939. With this factual background, an appraisal of the postwar feeding job is offered.

Mr. Bennett, as executive director of the Food Research Institute, is in a position to gather these facts, and the conclusions he reaches should be relatively close to the true picture.

Raisin Moth Control

PREVENTING DAMAGE TO COMMERCIAL DRIED FRUITS. By Heber C. Donohue, Perez Simmons, Dwight F. Barnes, George H. Kaloostian and Charles K. Fisher. Published by the Department of Agriculture, Washington, D. C., 1943, as Leaflet 236. 5 pages; 6x9 in.; paper. Price, 5 cents.

This government leaflet is designed to help the dried fruit industry in California and Arizona, where the so-called raisin moth does extensive damage to the raisin, peach, apricot, pear and fig crops. Methods of controlling the infestation under various conditions are recommended and illustrations are offered indicating how these methods are to be applied.

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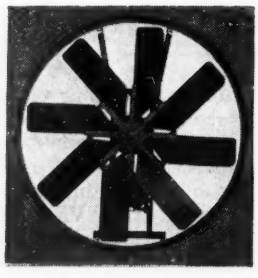

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CATALOG PAGES
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Should CMP Regulation 5 not cover your requirements, file form PD-1A with your nearest WPB Field Office. All orders must bear a priority rating of AA-5 or better.

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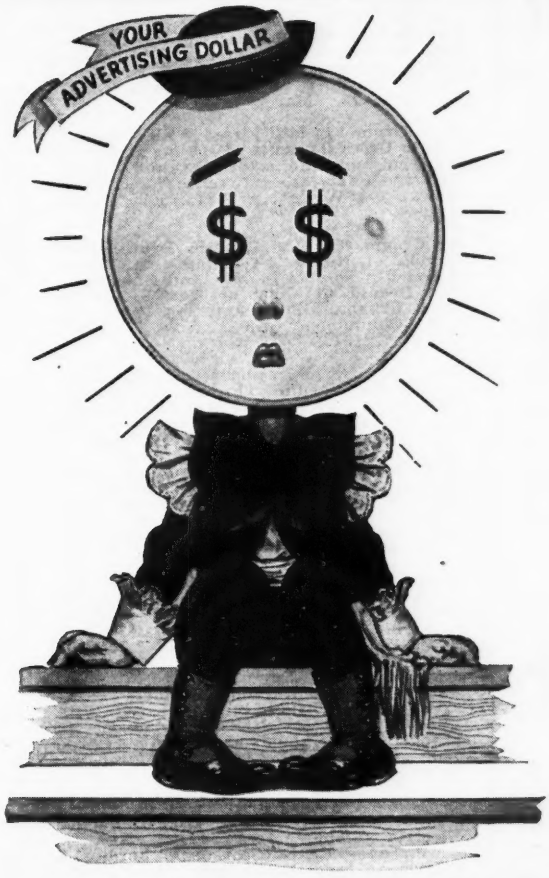

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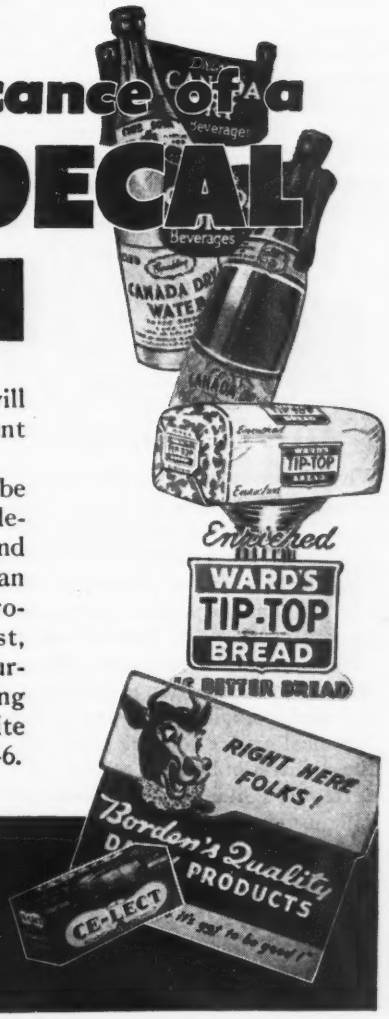

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PATENTS

Milk Treated With Rennet Enzyme to Produce Soft Curd Characteristics—Berhard Spur, Copenhagen, Denmark, to Chr. Hansen's Laboratory, Inc., Little Falls, N. Y. No. 2,343,713. March 7, 1944.

Grain Ground in Mill Fitted With Rotating Unit to Drive Contents of Milling Chamber Between and Against Upper and Lower Abrasive Surfaces—Lawrence E. Egedal, Milwaukee, Wis. No. 2,343,757. March 7, 1944.

Ice Cream Made to Contain Minute Dispersion of Non-acid-forming Gas Which is Readily Soluble in Mix and Substantially Devoid of Odor or Taste—Charles Getz, Urbana, Ill., to Aeration Processes, Inc., Columbus, Ohio. No. 2,343,767. March 7, 1944.

Milk and Cream Deodorized During Passage Under Vacuum Through Single Unit Containing Two or More Heat Exchangers—Fritz G. Cornell, Jr., Mountain Lakes, N. J. No. 2,343,886. March 14, 1944.

Milk-protein Gel Dessert Made by Addition of 3 to 10 Percent by Weight of Lactone to Milk to Form Homogeneous Gel—Louis J. Huber and Lacey H. Evans, Minneapolis, Minn., to General Mills, Inc. No. 2,344,090. March 14, 1944.

Cereal Protein Fortified With From 2 to 6 Parts Per Hundred of Lysine to Increase Its Nutritive Value as Food—Richard J. Bock and Diana Bolling, Scarsdale, N. Y., to C. M. Armstrong, Inc. No. 2,344,229. March 14, 1944.

Fat and Fat-containing Products Packaged in Paper Containers Treated With Phosphoric Acid Stabilizer—Harold S. Mitchell, to Industrial Patents Corp., Chicago, Ill. No. 2,344,470. March 14, 1944.

Vegetable Particles Dehydrated by Subjection to High-voltage and High-frequency Electric Field—Alfred Vang, Newark, N. J., one-half to Stevenson, Jordan & Harrison, Inc., New York, N. Y. No. 2,344,754. March 21, 1944.

Dough Shaped in Machine Equipped With Refrigerated Roller Fitted With Scraper to Keep Roller Surface Free From Frost—Merlin A. Sticelber, Kansas City, Mo. No. 2,344,836. March 21, 1944.

Chewing Gum Base Made From Milkweed Latex—Carl E. Hartwig, Teaneck, N. J., and Boris N. Lougovoy, Jackson Heights, N. Y., to American Chicle Co., Long Island City, N. Y. No. 2,344,916. March 21, 1944.

Top Crust Doughs Put on Pies by Mechanical Means—Lloyd J. Harriss, Kenilworth and Bernard Lambers, Oak Park, Ill., to Lloyd J. Harriss. No. 2,345,045. March 28, 1944.

Ready-to-bake Biscuits Arranged Into Proper Position and Relation to Each Other for Packaging by Mechanical Means—Lively B. Wilioughby, to Ballard & Ballard Co., Inc., Louisville, Ky. No. 2,345,310. March 28, 1944.

Ground Coffee Subjected to Pressure of 40 to 80 Tons Per Square Inch as Aid in Preserving Desirable Qualities — Julius Brenzinger, Fairfield, Conn., to Max Ams Machine Co., Bridgeport, Conn. No. 2,345,320. March 28, 1944.

Partially Gelatinized Mixture of Starch and Water-insoluble Protein Suspended in Fat to Give Mixture With Low Water Absorption—Ben F. Buchanan, Leonia, N. J., and Robert L. Lloyd, Laurelton, N. Y., to American Maize-Products Co. No. 2,345,322. March 28, 1944.

Roasted Coffee Extracted With Liquid SO_2 for Separation of Valuable Flavor and Aroma Constituents — Robert Louis Brandt, to Coffee Products Corp., New York, N. Y. No. 2,345,378. March 28, 1944.

Skins and Rind Substances Heated in Oil to Give Slow Expansion of Cellular Structure With Final Violent Rupturing of Expanded Cells for Making of Food Product—Robert R. Cox, La Junta, Colo. No. 2,345,463. March 28, 1944.

Coffee Cakes Given "Streusel" Topping by Mechanical Means—Le Conie Stiles, Seattle, Wash. No. 2,345,637. April 4, 1944.

Sauerkraut Made and Stored in Closed, Valved Fermenter To Prevent Contact With Air and Maintain CO_2 Under Slight Pressure in Head Space—William H. Harrison, Wilmette, Ill., to Continental Can Co., Inc., New York, N. Y. No. 2,345,814. April 4, 1944.

Objectionable Tastes and Odors Removed From Fat-soluble Vitamin-containing Materials and Protection Given Against Oxidative Changes by Use of Natural Antioxidants in Vegetable Oils or Vegetable Oil-containing Materials—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,345,960. April 4, 1944.

Objectionable Odor, Color and Taste Removed From Fat-soluble Vitamin-containing Materials by Use of Organic Solvent-treated Activated Carbon and Small Quantity of Natural Antioxidant Obtained From Vegetable Oils and Vegetable Oil-bearing Substances—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,345,961. April 4, 1944.

Ground Meat Reduced to 20 to 55 Percent Moisture Content by Exposure in Thin Layers to Current of 0 to 30 Deg. C. Air With Relative Humidity of Less Than 73 Percent—Edgar L. Pirest, St. Paul, and Edward C. Ritchell, Minneapolis, Minn., to Regents of University of Minnesota. No. 2,346,232. April 11, 1944.

Yeast Grown With Vigorous Aeration in Medium Containing Sugar, Phosphate and Nitrogen Calculated as Ammonium Tartrate To Give Increased Yield—John J. Enright, Pittsburgh, and Herbert Elliott Foote, Mount Lebanon, Pa., to Standard Brands, Inc., New York, N. Y. No. 2,346,671. April 18, 1944.

Egg Meats Filtered Through Fine-mesh Screen Positioned So One Surface Is Substantially Covered by Unfiltered Egg Meats While Other Surface Is Equally Covered With Filtered Egg; Vigorous Movement of Screen Causes Dislodgement of Solids To Permit Flow of Egg Meats Through Screen as Rapidly as Filtered Egg Is Removed From Container—Benjamin R. Harris, Chicago, Ill. No. 2,346,682. April 18, 1944.

Calcium and Phosphate Ions Partially Removed From Acidified Liquid Milk by Contact With Reactivated Exchange Material—Maurice E. Hull, Columbus, Ohio, to M & R Dietetic Laboratories, Inc. No. 2,346,844. April 18, 1944.

Gelatine Dried in Films Upon Frame Sterilized by Irradiation With High Intensity Ultraviolet—Walter M. Urbain, to Industrial Patents Corp., Chicago, Ill. No. 2,346,880. April 18, 1944.

Hams Pumped Under Photoelectric Control To Introduce Definite Quantity of Pickle Solution—Charles T. Walter, to Industrial Patents Corp., Chicago, Ill. No. 2,346,953. April 18, 1944.

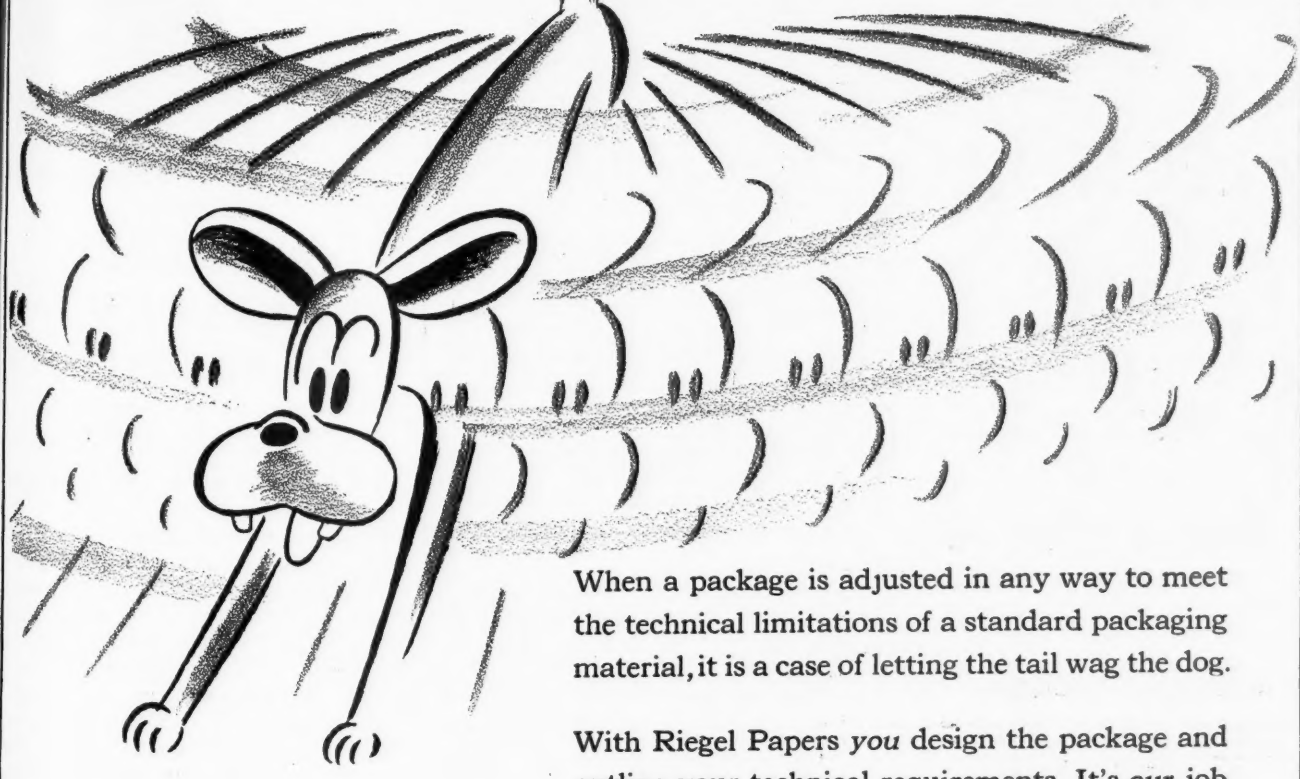
Eggs Graded According to Weight by Mechanical Means—Robert C. Sneed, Piedmont, and Curtis S. Jordan, Glendale, Calif., to Safeway Stores, Inc., Oakland, Calif. No. 2,347,068. April 18, 1944.

Physical Properties of Fermenting Dough Tested to Determine Response to Compression, Fluidity, Elasticity and Change in Retained Gas Pressure—Wilbur S. Claus, to Campbell-Taggart Research Corp., Kansas City, Mo. No. 2,347,082. April 18, 1944.

Sugar Crystal and Sirup Mass Centrifuged and Sprayed for Predetermined Time With Superheated Water To Obtain Desired Purification of Sugar Crystals—Eugene Roberts, Hastings, N. Y., and George E. Stevens, Denver, Colo., to Western States Machine Co., Hamilton, Ohio. No. 2,347,157. April 18, 1944.

Ice Cream Cones Packaged in Folding Carton Formed From Wedge-shaped Single Piece of Cardboard—Warren S. Watts, Montclair, and George J. Losson, Arlington, N. J., to Eskimo Pie Corp., Bloomfield, N. J. No. 2,347,161. April 18, 1944.

DON'T LET THE *Tail* WAG THE DOG



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Ice Cream Sandwich Made by Forming in Cellulosic Molding Member Which Is Removable After Refrigeration—Warren S. Watts, Montclair, N. J., to Eskimo Pie Corp., Bloomfield, N. J. No. 2,347,162. April 18, 1944.

Sticky Caramel Coated Candy Bars Conveyed by Mechanical Means On Which Layer of Nuts Is First Deposited and Then Discharged Downwardly Through Air Along With Nonadhering Nuts For Further Coating—Santy C. Petrilli, to General Candy Corp., Chicago, Ill. No. 2,347,164. April 18, 1944.

Corn Steeped to Moisture Content Between 20 and 40 Percent Preparatory To Milling To Separate Bran, Glutenous Starch, Germs and Crown Starch With Subsequent Drying to 10 to 15 Percent Moisture Content and Separation Into Fractions of Different Sizes by Screening—Ellis Charles Pattee, Cincinnati, Ohio, to National Distillers Products Corp., New York, N. Y. No. 2,347,215. April 25, 1944.

Glutamic Acid Produced by Hydrolysis of Proteinaceous Material With Mineral Acid With Subsequent Neutralization—Paul R. Shildneck, to A. E. Staley Manufacturing Co., Decatur, Ill. No. 2,347,220. April 25, 1944.

Sugar Granules Formed Under Mechanical Control—John W. Schlegel and Louis Lang, New York, N. Y., to National Sugar Refining Co., Edgewater, N. J. No. 2,347,288. April 25, 1944.

Citrus Fruit Juices Heat-treated in Presence of Small Quantity of Salt Which Liberates Fats, Oils and Other Rancidity-producing Substances To Permit Floating to Top and Removal Before Sealing of Heated Juice in Containers—Gray Singleton, Fort Meade, Fla. No. 2,347,339. April 25, 1944.

High Potency Extracts Obtained From Fat-soluble Vitamin-containing Oils Using Methyl or Ethyl Alcohol at Elevated Temperature—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,347,460. April 25, 1944.

Potency of Fat-soluble Vitamin Concentrate Increased by Treatment With Activated Polyvalent Metal Phosphate—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,347,461. April 25, 1944.

Fat-soluble Vitamin-containing Fish Materials Treated With Tomato Product and Heating to Between 100 and 200 Deg. C. Under Reduced Pressure for Removal of Undesirable Taste and Odors and for Stabilization Against Oxidative Changes—Loran O. Buxton, Belleville, N. J., to National Oil Products Co., Harrison, N. J. No. 2,347,462. April 25, 1944.

Rancidity-susceptible Foods Protected Against Oxidative Deterioration by Subjection to Electrical Discharge Zone Under Partial Vacuum in Presence of Hydrogen Gas—Felix Kiefer, Flushing, N. Y. No. 2,347,486. April 25, 1944.

Canned Foods Processed at Regulated Temperature and Under Super-atmospheric Pressure During Continuous Passage Through Heat-treating Chamber—William E. Mitton, Shawano, Wis. No. 2,347,495. April 25, 1944.

Canadian Patents

Vegetables Diced While Being Forced by Action of Plunger, Activated by Manually Operated Screw Shaft, Through Cutting Grills Fitted With Rotating Cutter Blade—Theodore R. Johnson, Menasha, Wis. No. 418,977. March 14, 1944.

Starch Pregelatinized by Heat Treatment With Steam, in Presence of Controlled Quantity of Added Water to Avoid Fluidity, Followed by Drying and Grinding While Still in Moist Condition—Hans F. Bauer, to Stein Hall Manufacturing Co., Chicago, Ill. No. 419,074. March 14, 1944.

Milk Pasteurized in Unit Consisting of Interconnected Heater and Cooler Equipped With Electrical Controls With Electrodes Projecting Into Stream at Entrance and Exit Ends of Conduit To Regulate Treatment for Predetermined Period—Wilmer D. Barrett, to Whiting Milk Co., Charlestown, Mass. No. 419-088. March 14, 1944.

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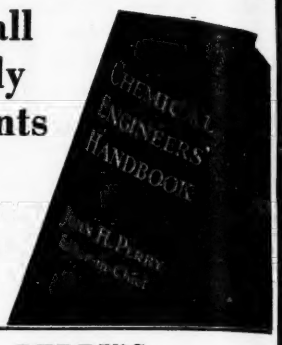

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Facts About Packaging

(Continued from page 92)

contained almost 70 percent CO_2 after only 2 months, while similar cans stored at 98 deg. F. contained 30 percent or slightly more CO_2 after one year.

Five percent of this gas was found in the air-packed cans after a year's storage. This evolution of CO_2 was accompanied by a decrease in oxygen content of these cans. The evolution of CO_2 at 130 deg. F. resulted in appreciable distortion of the packages, breaking the heat-seals of the paper containers within one month.

Storage at 130 deg. F. also very quickly reduced the ascorbic acid content of the product so that only one-third of the initial amount remained after one month, even in the gas-packed samples. When stored at 98 deg. F. the gas-packed samples lost a corresponding amount in 3 months. Moreover, the samples stored at 98 deg. F. retained only 60 percent of their initial thiamine content after 3 months. There was very little additional loss on subsequent storage. At room temperature, however, the gas-packed samples retained about 65 percent of their initial ascorbic acid content through one year's storage. Samples stored at this temperature also retained about 60 percent of their initial thiamine content after one year in storage.

3. Effect of Lower Moisture Content—Reducing the moisture content of the product to 2.9 percent as compared with the regular moisture content of 4.0 percent had little apparent effect on the storage characteristics of this product.

That Extra Something

(Continued from page 71)

the same type on the market today are similar in taste. If you doubt that statement, examine 50 bologna sausages, or any other type of cooked product, from as many different plants. In general there will be very little difference between any two of them in appearance and taste.

This result indicates that, in the main, there is no such thing as a privately owned or developed formula. Everyone responsible for the making of the bologna, or the other products, has learned what he knows from the same source in some manner or other. Why should that be so? Because no one has effectively tried to improve his products. All continue the established methods handed down from one generation to the other.

If you bake a line of fruit and nut sweet goods

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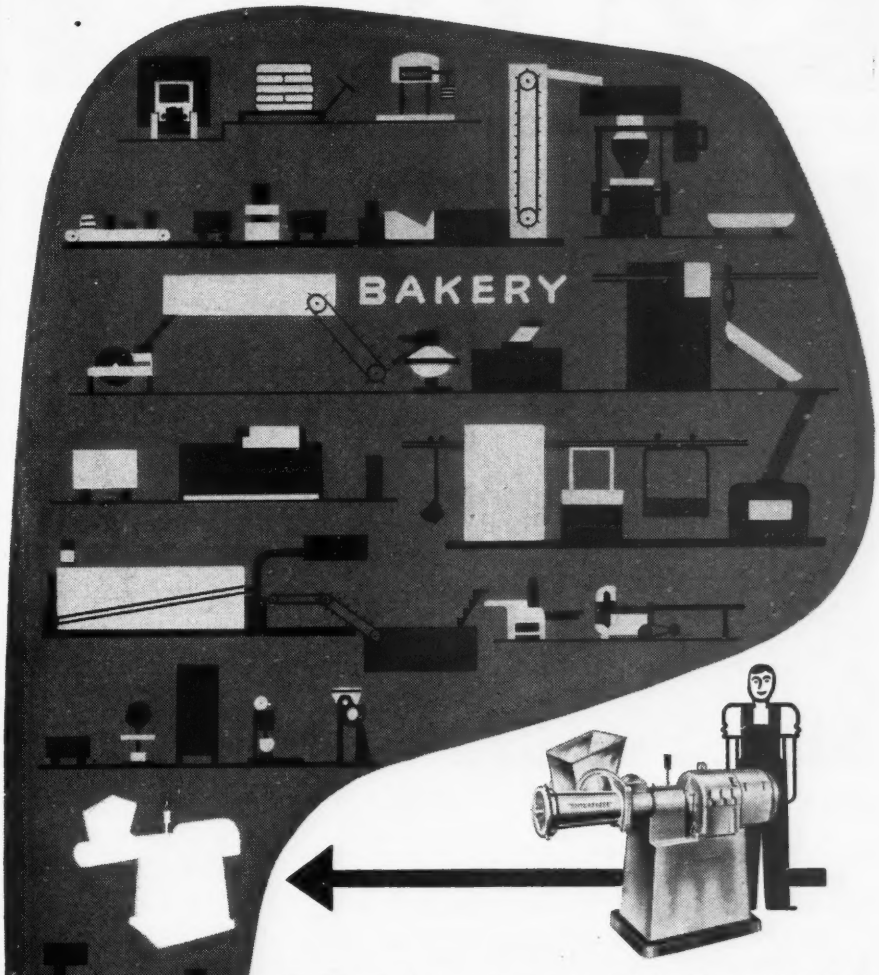

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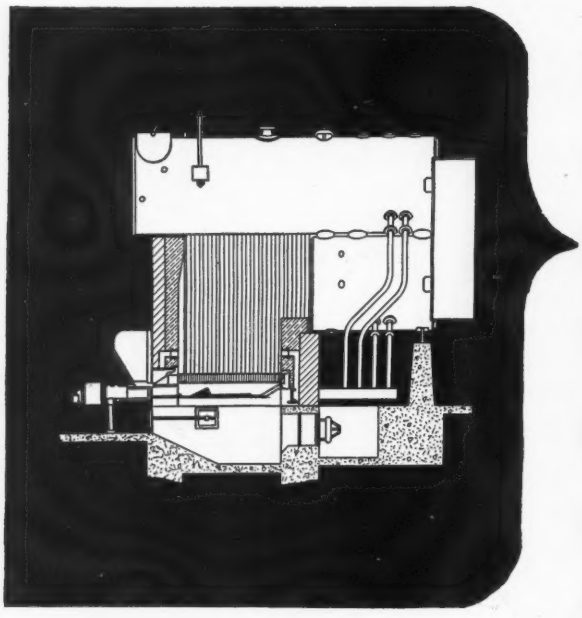

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In that practice lies the reason for the depreciation of consumer interest in the products of many large industrialized food plants, of which meat packing plants in general are an example. The consuming public is getting its fill of the similarity of all these products. To it, all sausages, meat loaves and hams are alike. In some instances, there may be some decorative difference. But in taste, flavor and other eating qualities they are too commonly all monotonously alike.

Well, Why Not?

Why should a manufacturer not have a product that is outstanding from the others? Within his reach is all of the materials necessary—more than enough in meat packing plants in normal times. Also, in normal times he has available a sufficiency of modern equipment, an abundance and variety of spices and seasonings prepared at their best and excellent shipping and marketing facilities.

But until each of these factors is used to its best advantage, the pulling power of good flavor, improved palatability and product individuality desired by every food consumer will remain unknown.

Jelling Power of Pectins

(*Continued from page 73*)

portant influence on firmness. To investigate this point, the data of Table I were obtained. It is seen that the difference between 16 hours of storage and 40 hours is only 0.5 percent of sag which, as shown by the curve of Fig. 2, amounts to only 2 percent of the pectin's true grade. For convenience, a storage period of 18 to 24 hours is adhered to, permitting jellies to be made one day and tested the next morning.

Effect of Storage Temperature On Percent of Sag

The data of Table II show the effect of storage temperature, which also may be assumed to be the jelly temperature at the time of testing. The variance between 20 and 30 deg. C. is so small that under ordinary conditions temperature control is unnecessary.

Reproducibility of Results

Table III shows the precision of duplicate determinations. Pectin *C* was tested six times over a period of two weeks. The data show a difference of plus or minus one grade point from the average indicated value of 154. Pectin *D* was similarly tested

four times with slightly less accurate results. Compared with hand grading, the reproducibility of results appears to be very good.

Comparison of Hand and Tester Grading

Table IV allows a comparison to be made between the results of expert hand grading and those of the instrument. The samples shown represent a number of lots of commercial pectin which had been standardized as closely as possible to 150 grade by hand grading.

Discussion

In routine testing, only two instead of four glasses of jelly are prepared, since this gives accuracy sufficient for the purpose. If desired, three glasses can be prepared, one being used in the setting-time determination. Then, since the jellies used under the tester are undamaged, they can be cut to dtermine texture.

Some difficulty may be experienced in turning out the jelly so that it will stand erect on the plate, but with the proper technic a vertical jelly can be assured.

The glass is held in a nearly horizonal position as a spatula is inserted between the top of the jelly and the glass. This causes the jelly to fall away from the container from the top of the glass to the bottom. Then by rotating the container, separation is effected over the entire surface. Finally, the jelly glass is inverted over the glass plate, allowing the jelly to slide out. Lockwood and Hayes suggested straightening the jelly by finger pressure if necessary.

The jelly glasses most nearly meeting the requirements of this method are the Hazel Atlas No. 85. These are not ideal because the bottoms are slightly concave and because it is necessary to grind off about $\frac{1}{8}$ in. of glass to obtain the desired depth of 3.125 in. at the center. After the war, it should be possible to locate more satisfactory glasses or to have plastic containers made with removable bands to serve as "sideboards."

Figure 1 shows a jelly glass with a strip of gummed paper acting as a "sideboard." The strip is $\frac{3}{4}$ in. wide and extends $\frac{1}{2}$ in. above the rim of the glass. Strips of ordinary paper about 1 in. wide, extending $\frac{1}{2}$ in. above the glass and secured by a rubber band, have been used satisfactorily.

Enough work has also been done to indicate the utility of the tester in determining the strength of low-methoxyl pectin in jellies of no sugar, 35 percent sugar and in jellies with milk.

The points of superiority of the present test method over other

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methods investigated are these. The jelly surface is not ruptured; the jelly is not strained beyond its elastic limit; jellies of commercial firmness can be tested; the instrument itself is rugged, simple and is easily made in any machine shop; friction of moving parts is not a factor; and finally, as the data show, the instrument measures jelly firmness accurately and reproducibly.

The tester and method are being used regularly in three laboratories of this organization and are being tested by two outside laboratories.

In conclusion, the authors wish to acknowledge the assistance of others in the Exchange, Dr. G. H. Joseph, Mr. J. L. Baker and Mr. W. E. Baier.

Reference

1. H. C. Lockwood and R. S. Hayes, *Journal of the Society of Chemical Industry*, vol. 50, 145T–151T, April 24, 1931.

Truck Maintenance

(*Continued from page* 81)

finds that the gasoline sheet for June 10 shows a speedometer reading of 20,561. So he immediately fills in the inspection notice. Later that night, the greaser, Bill Jones, services the truck, reports the mileage as 20,561 and returns the sheet to the clerk, who records the numbers 20,561 on Form T-1 and in the next column sets down the figure of 21,061. The last figure indicates when the next greasing should be done. To the right of the form he notes that the next "A" inspection should be done at 21,000 miles.

When the fuel-sheet speedometer reading for a truck is approximately the same as the reading found on Form T-1, that truck has run 500 miles or more and is ready to be greased again. In the second greasing, the work was not done until 20,561, or 61 miles late. This is close enough for all practical purposes.

The time for the third greasing and the second "A" inspection was determined by comparing the gasoline sheet of June 15, which shows the truck ran 21,152 miles, with the "Next Greasing Due" mileage figures, 21,061, and the "Next A Inspection Due Mileage," 21,000, on Form T-1. Another inspection notice is made out for the mechanic to service the truck.

The first "B" inspection was made on July 25, when Truck No. 103's mileage was 25,200, or 5,200 miles more than the original starting mileage of 20,000. The first "C" inspection was made on April 5 of the following year, when the mileage was 50,150, or 30,150 miles more. These "B" and "C" inspections are posted on Form T-2.

The paper part of the entire preventive maintenance system described in this article is shown in detail in the accompanying illustration. The daily gasoline and oil issuance sheet, the key to the maintenance system, is shown in the top right hand corner of the illustration.

Costs Not Increased

Operating a control system of this kind does not increase management's costs. The writer has shown that extra employees do not have to be hired to operate it. In one fleet of 45 tractors and 20 retail delivery trucks, the shop clerk had only to put in 1½ extra hours of work a day in keeping the records.

A preventive maintenance system makes it possible to have a complete record of all truck greasings, motor oil changes and inspections on hand at all times. As a result, truck maintenance is not done haphazardly or at the whim or guess of the shop foreman.

LETTERS TO THE EDITOR

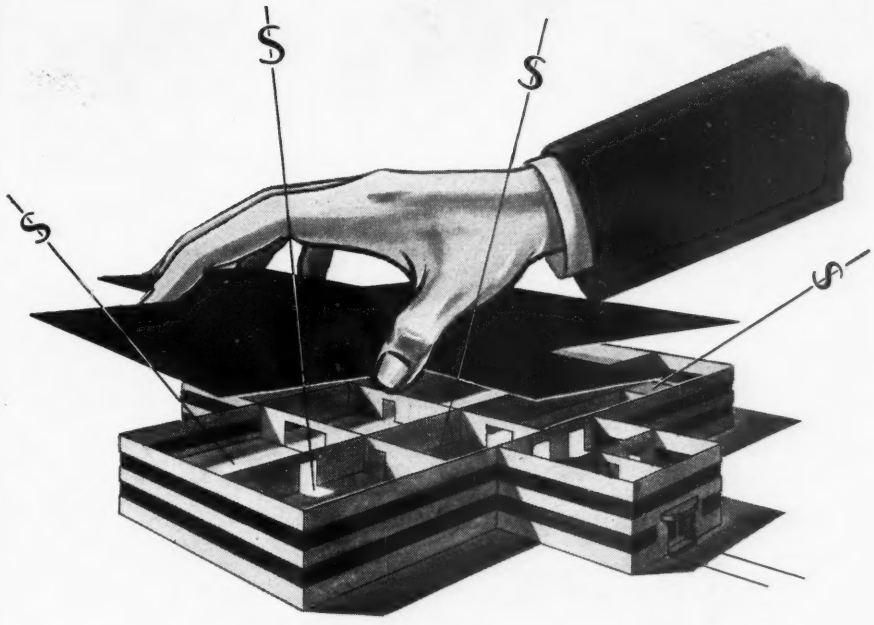
Special Ink for Use On Food Packages

To the Editor of
FOOD INDUSTRIES:

Your editorial, "Inexplicable Contaminations," in the March, 1944, issue of FOOD INDUSTRIES reminded us of a similar difficulty we had with a phenol-containing marking ink several years ago. In this instance the ink was used to price-mark packages and cans sold in self-service stores.

The penetrating powers of the odor of phenol are sufficiently strong to go through packages of breakfast cereals, cakes, cookies and coffee and contaminate the product. Since the difficulty was overcome, we thought the solution might be helpful to, or at least of interest to, the cherry freezer you mentioned in the editorial.

In connection with a printing ink company, we developed an ink which has all the desirable marking properties of the phenol-containing product and none of the undesirable odor and flavor contaminating characteristics. Should the cherry freezer be interested in getting some of this ink, it can be obtained from International Printing Ink Co., 417 E. Seventh St., Cincinnati 2, Ohio, under the number C-15772.—WALTER REIMAN, *Laboratories Division, The Kroger Food Foundation, Cincinnati, Ohio.*



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FOOD TECHNOLOGY

NEW DISCOVERIES AND INVENTIONS

ENZYMES

Meat Activates Papain

ENZYMATIC digests of meat can be dehydrated more readily than undigested meats and have better keeping qualities. Therefore the activity of papain preparations for such use is of interest.

When inactive, or almost inactive, papain is used in the digestion of beef muscle, liver and similar materials, the enzyme becomes more active as digestion proceeds and more sulphydryl groups are exposed. The initial activity does not indicate the potency of the enzyme in digesting such materials. Papain that will clot milk or digest hemoglobin very slowly can digest meat rapidly without cyanide activation.

Beef muscle digested with pepsin and then heated to destroy that enzyme gives a strong test for sulphhydryl. This preparation will reactivate papain inactivated by hydrogen peroxide.

The effect is not due to the activator occurring naturally with papain, because crystalline chymopapain can be reactivated by meat digested with pepsin.

Digest from "Activation of Papain During Digestion of Meat," by G. Y. Gottschall, *Food Research* vol. 9, 6-10, January-February, 1944.

CONFECTIONERY

Chocolate Mixture

SUBSTITUTION of dried corn sirup solids for 8 to 75 percent of the usual sweetening agent in chocolate bars and coatings has recently been patented.

It is preferred to use corn sirup solids made by spray drying a concentrated refined sirup to less than 3 percent moisture, but solids obtained by other processes may be used.

Use of this proportion of corn sirup solids gives a chocolate mixture which is less subject to blooming and which has less tendency to soften at moderately elevated temperatures. Also, the mixture is easier to handle in processing because of a relatively flat curve of viscosity against temperature.

The product has higher breaking strength than the usual composition with sucrose as sweetening agent. It is also claimed that it has less tendency to take up moisture in contact with a water-bearing material such as ice-cream.

Digest from U. S. Patent 2,328,791, issued September 7, 1943, to R. C. Drury and assigned to the American Maize-Products Co.

DAIRY PRODUCTS

Wheat Germ Oil in Milk

WHEAT GERM oil in concentrations up to 0.2 percent of the weight of the fat present prevents development of oxidized flavor in pasteurized whole fluid milk and does not have a noticeable effect on the flavor. Above 0.3 percent the wheat germ oil flavor was detectable and objectionable.

In frozen cream with 50 percent fat and with 12 percent added sugar, stored in quart waxed paper containers in an ice cream hardening room, wheat germ oil retarded oxidation even in the presence of copper. After 9 months in storage, cream pasteurized at 170 deg. F. for 15 minutes was judged better than cream pasteurized at 160 deg. F. for 30 minutes, with the same percentage of antioxidant. On shorter storage there was no difference between the products of the two pasteurizing treatments.

Powdered whole milk, both roller and spray dried, was less readily oxidized when wheat germ oil was added before drying. Addition of citric acid increased the protection. Packing in nitrogen also retarded oxidation. Neither treatment entirely prevented development of the oxidized flavor. A combination of wheat germ oil plus citric acid, with nitrogen packing, gave a distinctly higher flavor score after 8 months in storage.

Digest from "Wheat Germ Oil as an Antioxidant in Dairy Products," by P. H. Tracy, W. A. Hoskisson and J. M. Trimble, *Journal of Dairy Science*, vol. 27, 311–17, April, 1944.

Heat-resistant Bacteria

IN the examination of dairy products for coliform organisms, escherichia strains of comparatively high heat resistance were encountered rather frequently in butter. Of 116 cultures selected from isolations from butter, 64 percent survived 20 minutes at 143.0 deg. F., 41 percent survived 30 minutes and 24 percent survived 40 minutes, and some even survived 50 minutes at this temperature. Heat resistant *Aerobacter* cultures were not encountered.

These organisms do not seem to survive pasteurization in any considerable number, especially in acid cream, and it is suggested that the churn may be an important source of heat-resistant strains. The heat treatment given the churn in cleaning and sterilizing procedures may tend to select the more resistant types, which then multiply and are added to the butter in significant numbers during the manufacturing process.

Digest from "Heat Resistant Coliform Organisms, with Particular Reference to Butter," by H. F. Long, T. I. Hedrick and B. W. Hammer, *Journal of Milk Technology*, vol. 7, 20-25, January, 1944.

CEREAL PRODUCTS

Wheat Starch

WHOLE wheat kernels are used as a source of starch in a process reported from pilot-plant operation at the Northern Regional Research Laboratory.

Soft white wheat, normally high in starch, is preferred, but other types of wheat, including some unsuitable for making flour, have been treated successfully. The product is of better color, contains less protein, and gives more viscous pastes than the average commercial wheat starch now available. Costs depend on the raw material, but average 2.46 cents per pound. The gluten recovered is low in protein and unsuitable for commercial production of glutamate.

In runs on soft white wheat the kernels are steeped 24 hours with distilled water continuously recirculated at 100 deg. F. SO_2 is added to the steep water until the odor can just be detected. The steeped wheat is ground in a buhrstone mill with distilled water. Difficulty was experienced with a small-scale germ separator and this step is omitted. The slurry is screened over a 26-mesh stainless steel wire gauze, and the material which passes through is put through a No. 17 silk bolting cloth.

Starch is recovered on a 46-ft. starch table, the gluten flowing over the end of the table. A thin layer of gluten is removed from the surface of the starch by careful use of a stream of air. Gluten and starch so removed are returned to the starch table.

The starch is screened in water sus-

pension over No. 17 silk bolting cloth, the slurry is centrifuged, the starch washed, then dried at 165 deg. F. in an oven. Recovery of 72 to 74 percent is reported. Gluten slurry is also centrifuged and dried at 180 deg. F.

The steeping temperature for wheat must be under 103 deg. F. to avoid gelatinization, the gelatinization range for soft wheat being as follows:

First indications	104 deg. F.
Definitely started	108 deg. F.
All but smallest granules gelatinized	142 deg. F.
Complete	146 deg. F.

Digest from "Wheat Starch Manufacture," by R. L. Slotter and C. T. Langsford, *Industrial and Engineering Chemistry*, vol. 36, 404–8, May, 1944.

CANNING

Pea Contaminant

A NOTE from the School of Pharmacy, University of Washington, calls attention to work in progress which has indicated that the black and cut leaved nightshades are toxic.

These nightshades occur in the western pea canning regions and have been a problem to pea canners, since the fruit matures at the same time as the peas and is about the same size as peas.

The Food and Drug Administration regards nightshade berries as an adulterant in canned peas and prohibits the sale of peas so adulterated. The findings now reported support this view.

Digest from "A Poisonous Pea Contaminate," by Coy W. Waller, *Science*, vol. 99, 80, Jan. 28, 1944.

Aging of Canned Juice

CITRUS JUICE pasteurized at 190 deg. F., then canned so that it retains 92 to 98 percent of the vitamin C of the freshly reamed juice, still retains 75 percent of the original vitamin C content after one year at room temperature (about 75 deg. F.). Refrigerated storage, at 48 deg. F., increased retention during one year to 89 percent of the vitamin C of the freshly reamed fruit. (The authors point out that this increase through refrigeration amounts to the equivalent of 5 cents per case of 24 No. 2 cans on the basis of the current price of synthetic ascorbic acid.)

However, increase of the storage temperature to 98.6 deg. F. caused destruction of all but 17 percent of the vitamin C.

Flavor tests distinctly favored refrigerated storage, at any time after the first month. After one year, the juice stored in the refrigerator was reported to have a flavor practically equal to fresh canned juice. That stored at room temperature had a slightly oxidized taste, although not objectionable. After 4 months, juice at 98.6 deg. F. was definitely off-color and off-flavor, and after 6 months the samples were distinctly disagreeable.

Digest from "Effect of Time and Temperature of Storage on Vitamin C Retention in Canned Citrus Juices," by E. Ross, *Food Research*, vol. 9, 7–33, January-February, 1944.

FATS AND OILS

Consistency Measurement

CONSISTENCY of the plastic fats is a highly important property for which standard, or even generally reproducible, test methods have been lacking. The authors report on the construction of a micro-penetration apparatus with which tests can be standardized, and give operating directions for the equipment.

Micro-penetration tests on properly prepared samples of plastic fats give a curve for temperature which is as definite and characteristic of a particular fat as its melting point, solidification point or fiber, with close correlation to the macro-penetration consistency of the finished product. Micro-penetration must be used for laboratory samples because it is impossible

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to chill larger samples with sufficient rapidity to get a small and uniform crystal structure.

An accurately machined heavy iron base is provided for the apparatus, with positioning guides for the sample blocks and a support for the glass capillary tube which serves as a guide for the free-falling penetration needle. The needles are machined from music wire, with hardened points, and can be prepared to identical weight and dimensions. The sample blocks are turned from bearing bronze. The authors use blocks $1\frac{3}{8}$ in. in diameter, 2 in. high, with a vertical sample hole $\frac{7}{16}$ in. in diameter and $1\frac{5}{8}$ in. deep. The needles, weighing 0.500 g. each, are 0.042 in. in diameter, 73.6 mm. long, with a 30-deg. conical point ground in a jig and hardened. The needle drops 330 mm.

The standard operating conditions suggested include chilling of the fat in the test blocks for approximately 16 hours, followed by tempering periods of 30 minutes each at successively increasing temperature intervals of 5 deg. C. (9 deg. F.).

For control testing on hydrogenated oils of the approximate consistency of shortening or margarine, in the range from 68 to 77 deg. F., chilling and tempering times can be reduced to 15 minutes each. The results of the quick and standard methods bear a definite relationship to one another and a correlation curve can be plotted for any given product.

The method is sensitive to a change in consistency amounting to less than 1 unit change in iodine value, and to that resulting from an addition of hard fat of less than 0.5 percent.

Curves are presented for peanut oil, cottonseed oil and soybean oil hydrogenated to varying degrees of hardness.

Digest from "Measurement of the Consistency of Plastic Vegetable Fats, A Standard Micro-penetration Technique," by R. O. Feuge and A. E. Bailey, *Oil & Soap*, vol. 21, 78–84, March, 1944.

ENGINEERING

Use of Ion Exchangers

AFTER reviewing the development of ion exchange apparatus and the reactions involved, the author points out certain possible fields of application of interest to the food industry. These are based on the ability of the resinous cation-anion exchange systems to remove metallic salts from nonelectrolytes such as sugar, gelatine and glycerine. Water is essential for the operation of the exchangers, but the amount required is very small.

Other uses in the food field include the Matchett recovery of tartaric acid from winery wastes, Block's process

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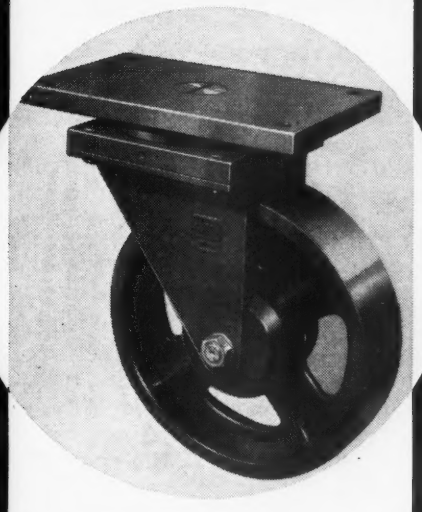

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Digest from "Ion Exchange Processes and Applications," by F. J. Myers, *Refrigerating Engineering*, vol. 47, 287-90, April, 1944.

MISCELLANEOUS

Fruit Development Aided

In greenhouse experiments, application of a growth-promoting substance to the opening flower clusters has been found to promote the development of seedless fruit on tomato plants. Naphthoxyacetic acid dissolved in cyclohexanone was dispersed by means of di-methyl ether under pressure. In the test plants the number of fruit set averaged six times as many for the treated plants as for the controls, and after 36 days the average diameter of the fruit for the treated plants was 2.9 in., as against 2.1 in. for the controls.

Investigation of the method will be continued.

Digest from "Aerosol, A New Method of Applying Growth Regulators to Plants," by C. L. Hamner, H. A. Schomer and L. D. Goodhue, *Science*, vol. 99, 85, Jan. 28, 1944.

Soft Rot of Potatoes

Spore-forming bacteria causing retting of flax have also been shown to cause soft rot in potatoes, both processes being due to the decomposition of the pectin complex of the middle lamella. An organism studied at the Water Pollution Research Laboratory, Hertfordshire, England, producing enzymes that rot potatoes and ret flax, has been shown to be *Bacillus subtilis*. *B. polymyxa* had previously been reported to cause potato rot.

Digest from "Spore-forming Bacteria Causing Soft Rot of Potato and Retting of Flax," by L. A. Allen, *Nature*, vol. 153, 224-35, February 19, 1944.

Coffee Treatment

Loss of volatile constituents from fresh roasted coffee can be prevented by means of a glycerine and sugar coating on the beans, according to a new patent. The glycerine and sugar, dissolved in about an equal weight of water, is sprayed cold on the freshly roasted beans. The water evaporates immediately and the glycerinated sugar coating seals the aroma constituents within the beans. Beans so treated will remain fresh without special packaging.

Digest of U. S. Patent 2,340,235, issued January 25, 1944, to M. P. Tribuno, Bayside, Long Island, N. Y.

QUESTIONS and ANSWERS

Mold Prevention

Illinois—"Lately we have found that after our preserves are put in jars, and stand for a time, mold forms. This item is usually cooked to 221 deg. F. and packed at 150 deg. F. Can you tell us what causes this mold and what we can do to prevent it?"

We assume that you understand the ease with which mold growth can get started in plants in which fruit, confectionery and other sugar-containing foods are processed, and have a systematic procedure for washing down walls, ceilings and equipment, as well as floors, with some fungicide containing active chlorine. Such a procedure helps to keep contamination under control.

Since the preserve is cooked to 221 deg. F., there is no question about the product being sterile at the end of the cooking period. Either the jars are not sterile and are relatively cool when the preserve is put into them or the seals are not being applied quick and tight enough after the jars are filled.

The condition of the jars can be improved by giving them a relatively warm rinse with water containing a very small quantity of fungicide, followed by a clear water rinse with hot water. The second rinse will remove traces of the chlorine solution and raise the temperature of the jars. By thus raising the temperature of the jars the pouring temperature of the preserves can be increased. Since the product is cooked to 221 deg. F., there can be no harm in packaging at 175 to 180 deg. F.

A temperature of 150 deg. F. is on the borderline for killing mold spores, and if the surface cools before capping any spores entering from the air will not be killed. Even when the preserves are packaged at 175 to 180 deg. F. the jars should be closed air tight immediately after filling. As the steam in the head space condenses a partial vacuum develops and the seal becomes secure against subsequent temperature and barometric changes. There will also be insufficient oxygen in the head space to support mold growth.

A further advantage of packaging at 175 to 180 deg. F. is that it aids in sterilizing the under surface of the closure, particularly if the jars are inverted for a few minutes after filling. They must be righted while the preserves are still hot, so that there will be no air bubbles in the bottom or throughout the jar after cooling.

The cooling rate of jars filled at this temperature must be watched. They must not be cooled too abruptly, with consequent breakage, nor cooled so slowly that there is damage to the flavor and color of the product. The temperature must be less than 150 deg. F. when the filled jars are put into the shipping container.

Asparagus Canning

Illinois—"Have you any information on the canning of green asparagus? If so, would you please send it to me?"

We give the general process. There may be variations in commercial procedure, according to the variety packed and the type of equipment used.

Green asparagus is handled as quickly as possible to prevent wilting, development of bitterness and toughness. The stalks are washed, placed on racks with all the tips lying in the same direction, and the butt ends cut off with a long knife. Then the stalks are sorted for size, color and quality.

The different grades are placed in wire baskets, butt end down, held in place with a rack to prevent floating.

Blanching consists of subjecting the butt end to a 2 percent boiling salt brine for 3 minutes, followed by complete immersion for another 2 minutes. After blanching, the stalks are chilled quickly in cold water for from 5 to 6 minutes to prevent further cooking and to keep them firm. Wicker or bamboo baskets are recommended, if obtainable, because iron baskets will corrode rapidly in the salt brine and may discolor the asparagus.

After blanching and cooling, the asparagus is filled quickly into cans. It is well to grade again because there may be some off-color or breakage.

If discoloration does take place, it can be minimized or corrected by using 0.05 percent of citric acid in the water that is put in the cans. In this case enameled cans are recommended.

The filling solution consists of 8 lb. salt to 40 gal. of hot water. After filling, the cans are exhausted from 6 to 8 minutes at 190 deg. F. for small cans, and 200 to 205 deg. F. for large cans.

During retorting, No. 2½ and smaller cans are heated 20 minutes at 244 deg. F. or 25 minutes at 240 deg. F. No. 10 tins are heated 35 minutes at 240 deg. F. Cans are then cooled as rapidly as possible to prevent breaking and overcooking of the stalks or discoloration of the cans. Cold water and compressed air are run into the closed retort at the same time. This prevents too great a strain upon the cans. All No. 10 cans should be cooled under pressure.

FORMULAS FOR FOODS

FORMULA NO. 470

Banana Sherbet

Banana powder (full ripe)	4 lb.
Water	4½ gal.
Granulated sugar (cane or beet)	11 lb.
Dextrose (corn sugar)	3 lb.
Locust bean gum	2½ oz.
Egg color	1 oz.
Citric acid solution (50 percent) or its equivalent	2 oz.

Directions

Mix banana powder with 4 lb. of granulated sugar, then soak the mixture in 2 gal. of water and acidify with 2 oz. acid. Allow the mixture to stand for about half an hour.

Combine 7 lb. of sugar, 3 lb. of dextrose and 2½ oz. of vegetable stabilizer. Heat 2½ gal. of water to 180 deg. F. and dissolve the dry mixture in it, then incorporate the soaked sweetened banana by mixing the entire batch thoroughly. Add color.

Freeze until an overrun of about 40 percent is obtained.

Remove from freezer, place in containers and store in a sharp room of −15 or −20 deg. F.

For a banana milk sherbet, replace 1 gal. of water with 1 gal. of milk or condensed skim in the heated portion of the water. Sometimes vanilla extract is added to flavor the mixture at the rate of ½ oz. per gallon of mix.

Formula from B. I. Masurovsky.

FORMULA NO. 471

Dehydrated Fish Chowder

Fish, dehydrated*	2 lb.
Potatoes, extruded, dehydrated	2 lb.
Onions, crushed flakes, dehydrated	10 oz.
Whole-milk powder	2 lb. 8 oz.
Flour	1 lb. 6 oz.
Salt	8 oz.
Black pepper	to taste (0.05 oz.)

* See article on fish dehydration, *Food Industries*, June, 1944.

Directions

Mix ingredients thoroughly. Pack under vacuum

Ingredients pack out to 48 cans, size 307x202, net contents 3 oz. each.

This formula is given in proportion for lean fish. For the fatter species, such as pilchard, owing to the lesser degree of rehydration the amount of fish should be increased by 20 percent.

From the standpoint of flavor acceptability, the order of species preference for chowders prepared in the laboratory has been cod, mackerel, salmon, pilchard and rockfish. On the basis of overall costs, salmon and rockfish probably would be too expensive to compete on the same basis with the other species mentioned.

To Serve

Mix dry ingredients together. Measure 2 cups cold water and add gradually with constant stirring. Place on low heat for 20 minutes, stirring occasionally. This will give the ingredients an opportunity to rehydrate. Simmer for 20 minutes, stirring occasionally, and serve.

Formula from Technological Laboratories, Fish and Wildlife Service, Seattle, Wash.

FORMULA NO. 472

Buttermilk Cookies

Sugar	22 lb. 8 oz.
Shortening	10 lb.
Soda	10 oz.
Buttermilk powder	1 lb.
Salt	5 oz.
Nutmeg	1¼ oz.
Whole eggs	2 lb. 8 oz.
Molasses	4 lb.
Water	7 lb. 8 oz.
Cake flour	33 lb. 8 oz.

Directions

Mix together the sugar, shortening, milk powder, soda, salt and nutmeg. Add the eggs in two batches, approximately half each time. Add the molasses and water, stirring into the mix. Add the flour and fold in.

Run on wire-cut cookie machine, using a 4-hole die. Scale 6½ oz. to the dozen, making about 200 dozen cookies from this amount.

Bake at about 375 deg. F.

Formula from P. C. T. Ewert, Excelsior Baking Co., through American Society of Bakery Engineers.

FORMULA NO. 473

Peanut Chews

Corn sirup	50 lb.
High-grade molasses	50 lb.
Standardized invert sugar	25 lb.
Peanut butter	20 lb.
Salt	10 oz.
Roasted peanuts	45 lb.

Directions

Boil the corn sirup, molasses and standardized invert sugar to 242 to 244 deg. F. Add the peanut butter and salt. Mix thoroughly. Grind the roasted peanuts roughly, add to the mixture, and mix in well. Spread on an oiled slab between metal bars, rolling down to the required height.

When cold, cut into squares, oblongs or bars and coat with chocolate or wrap in waxed paper or cellophane.

This is an emergency formula, adapted for wartime shortages.

Formula from The Nulomoline Co.

FORMULA NO. 474

Nut Twists

Cream cheese	2 lb.
Enriched flour	4 lb.
Shortening, hydrogenated	7 oz.
Salt	if desired
Salted peanuts	

Directions

Cream shortening and cream cheese together. Work in the flour, sifted with the salt. Chill. Roll to thickness of ⅛ in. Cut in strips or triangles. Brush with melted butter. Sprinkle on the peanuts, finely chopped and roll.

Bake in an oven which is at 375 to 400 deg. F. for 8 to 12 minutes.

These should be short and crisp. The individual twists must be small, suitable for "snacks."

FORMULA NO. 475

Raisin Dutch Cake

Flour	15 lb.
Sugar	2 lb.
Shortening	2 lb.
Salt	2½ oz.
Water (variable)	8 lb.
Seedless raisins	12 lb.
Dry milk solids	8 oz.
Eggs, whole	1 lb. 8 oz.
Yeast	1 lb.

Directions

Mix all of the dough except the raisins for 12 to 15 minutes, then add the raisins and mix 5 minutes longer. If mixed in a cake mixer, use medium speed.

This dough will mature in 1 hour and 15 minutes to 1 hour and 30 minutes. Punch and let rest 25 to 35 minutes. Total time, 2 hrs. and 5 min. Temperature for fermentation should be 80 deg. F.

Scale, round up. Let rest 12 minutes, then round up again. Place on flat pans. Press down slightly before baking. Decorate with a little icing on top. Be sure to give full proof.

This dough can be made up as coffee cakes, "snails" or raisin buns.

Formula from Sun-Maid Raisin Growers Association.

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